VOL. XXIII. Nº 9.
SEPTEMBER 1938

MECCANO MAGAZINE

THE AIR PATROL

6D.

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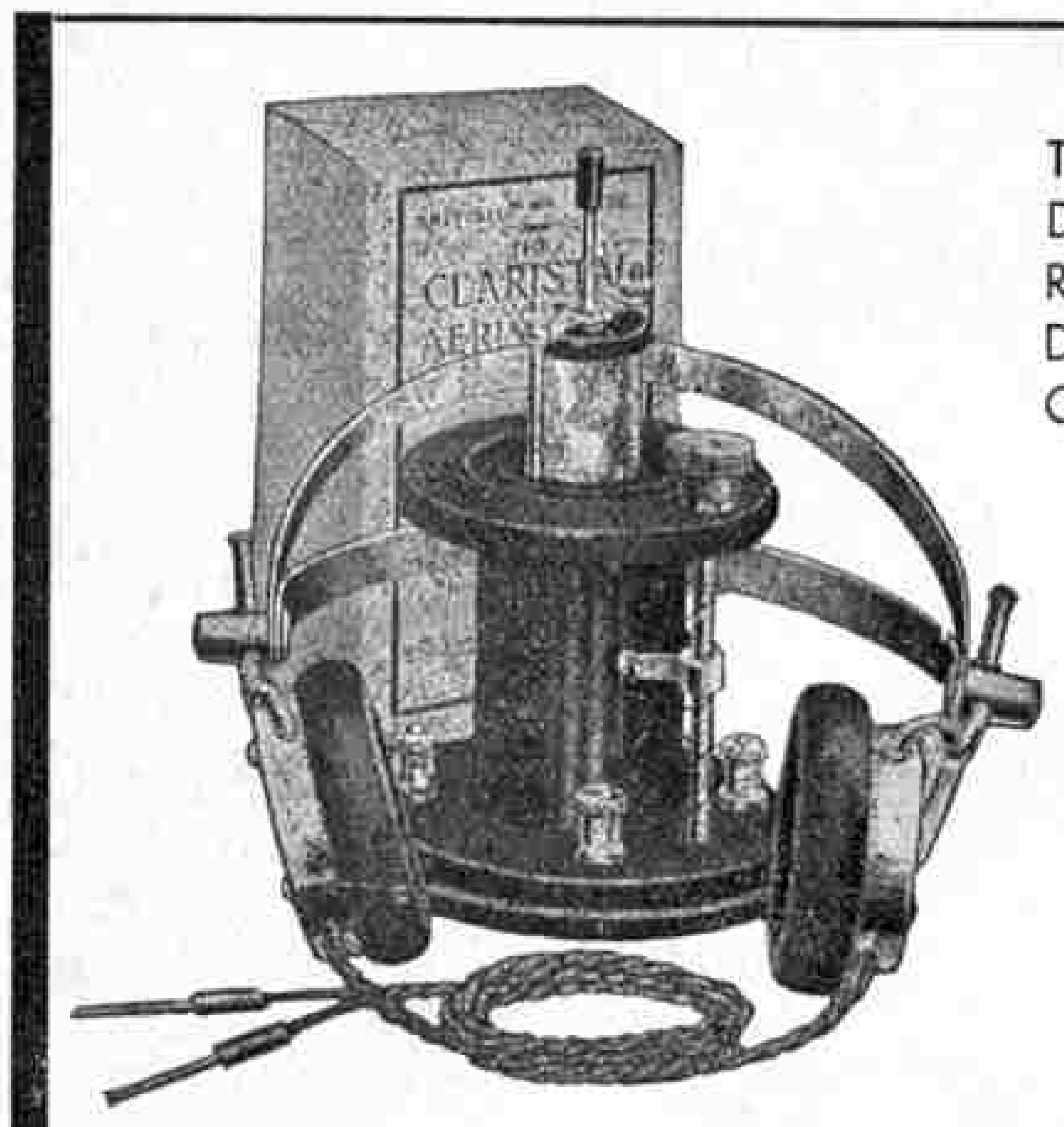

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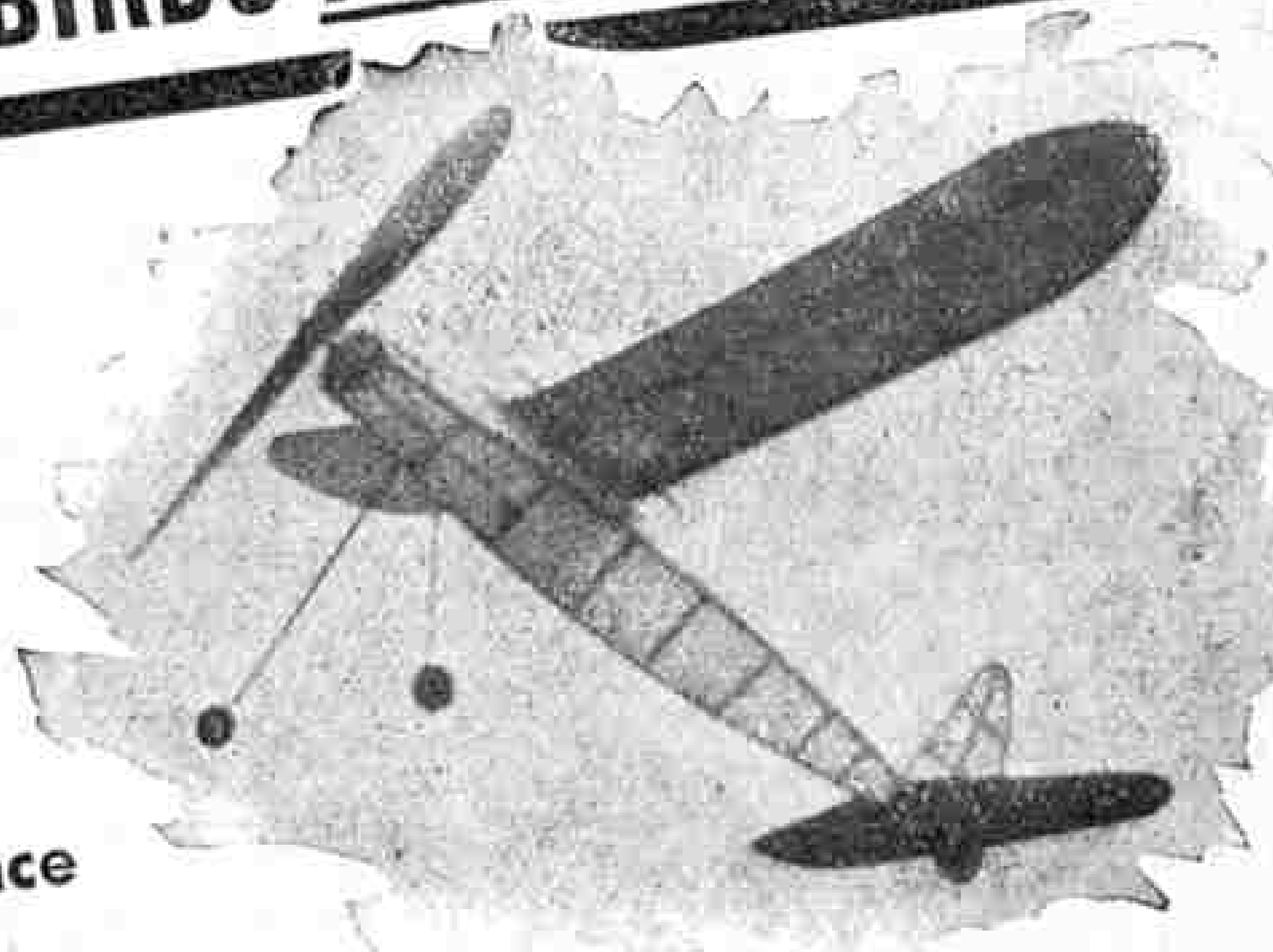

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The Hornby-Dublo Electric Trains operate on 12-volt direct current, and are intended to be run from mains alternating current through a Dublo Transformer connected to a Dublo Controller. Where mains alternating current is not available, the trains can be run satisfactorily from a 12-volt accumulator.

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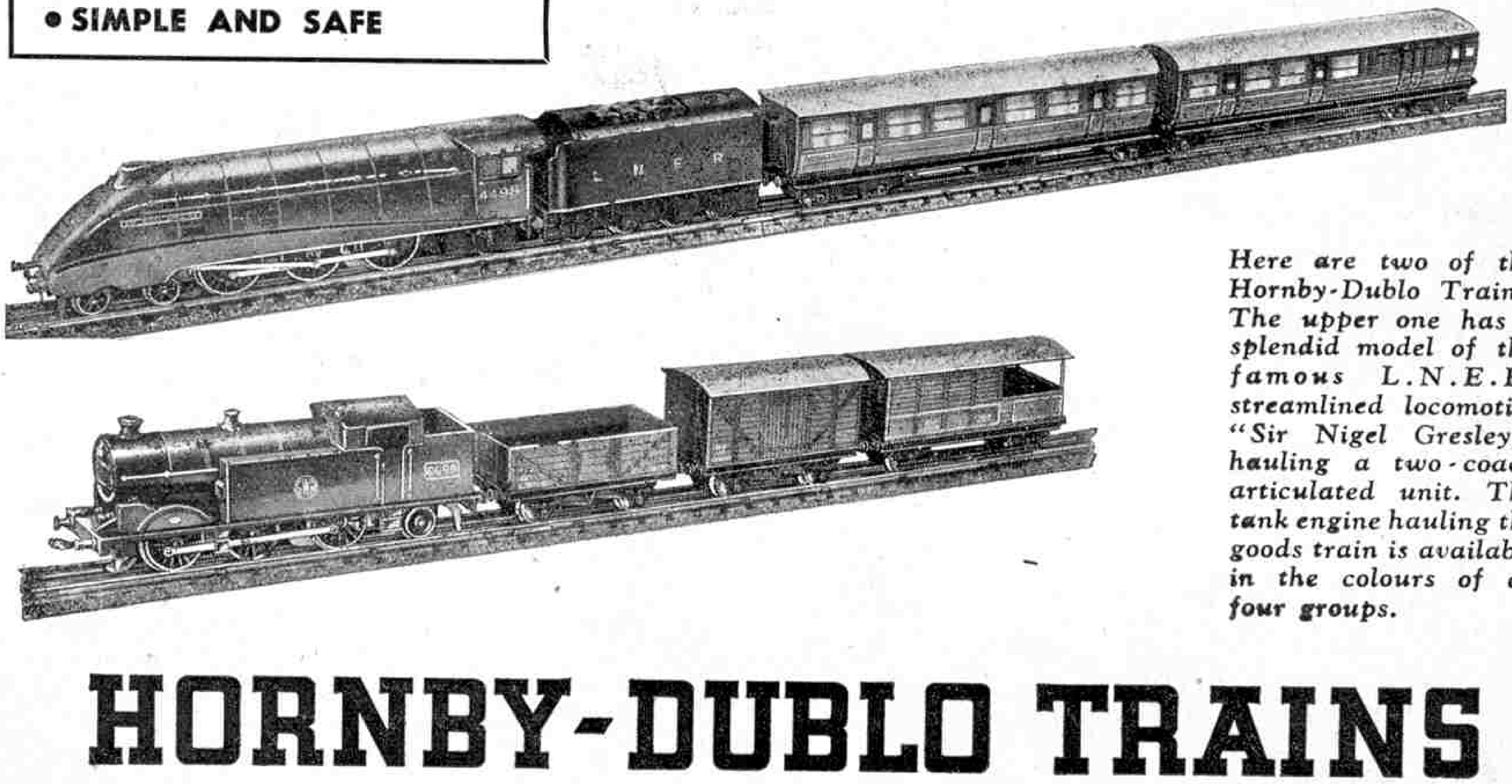

Here are two of the Hornby-Dublo Trains. The upper one has a splendid model of the famous L.N.E.R. streamlined locomotive "Sir Nigel Gresley," hauling a two-coach articulated unit. The tank engine hauling the goods train is available in the colours of all four groups.

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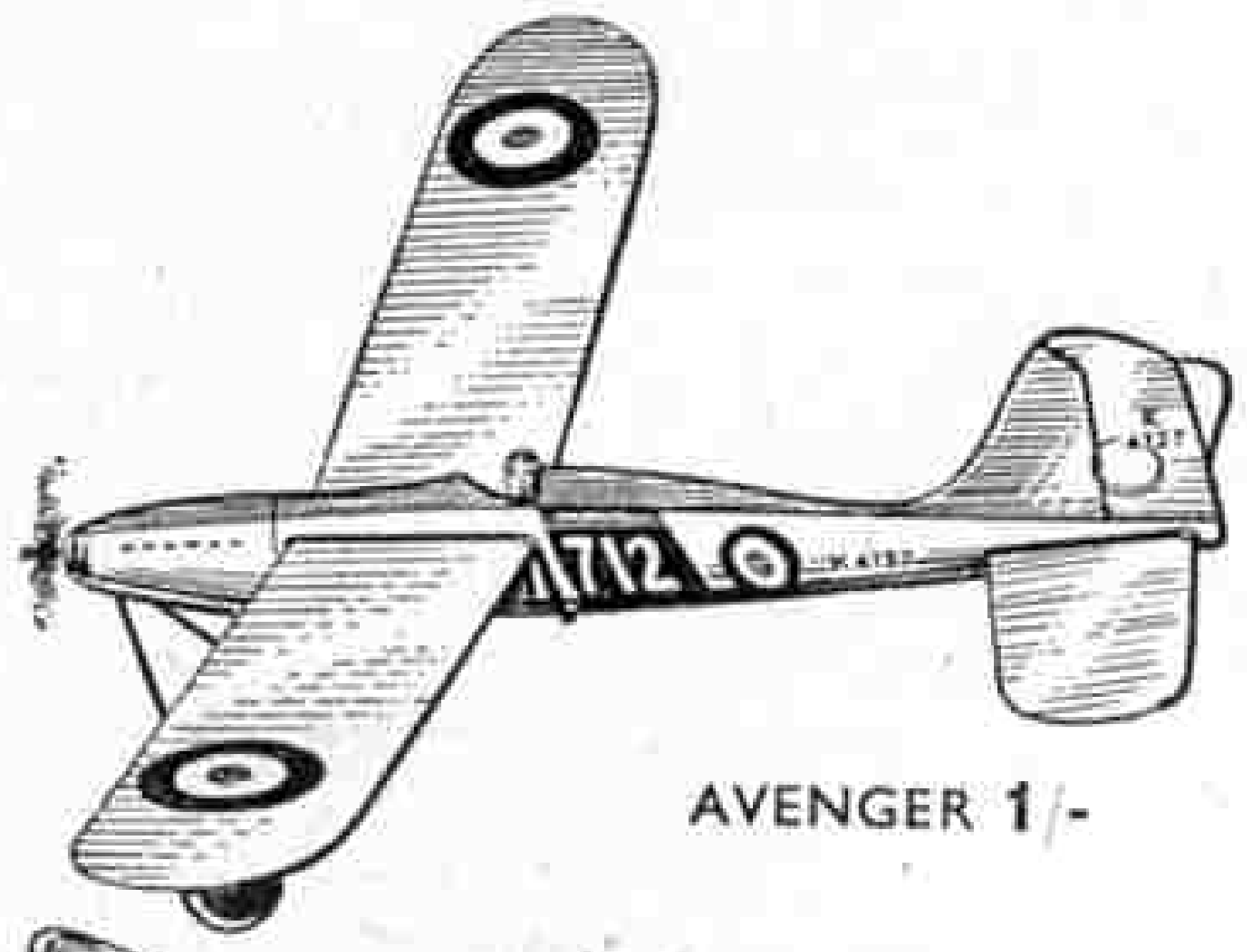

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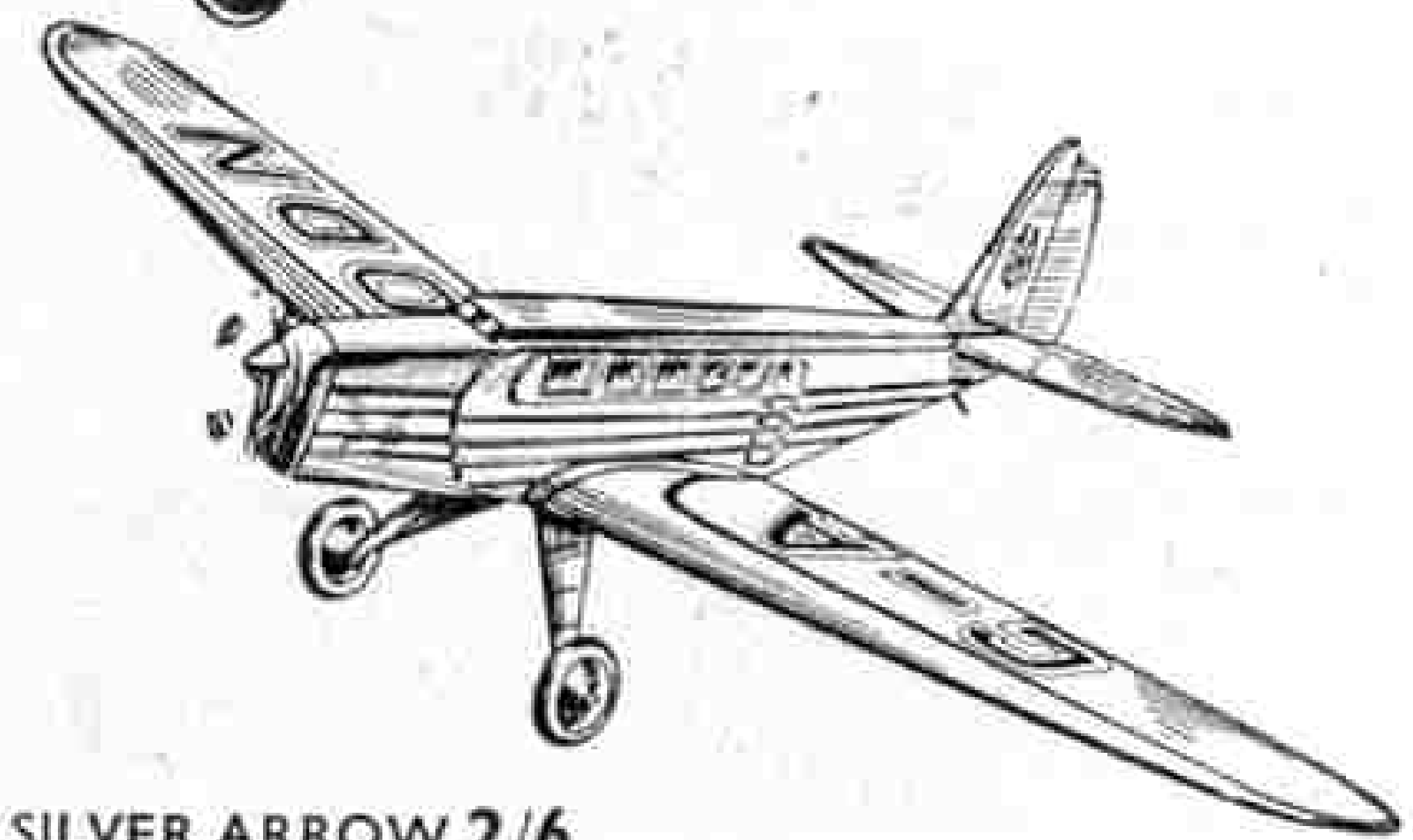
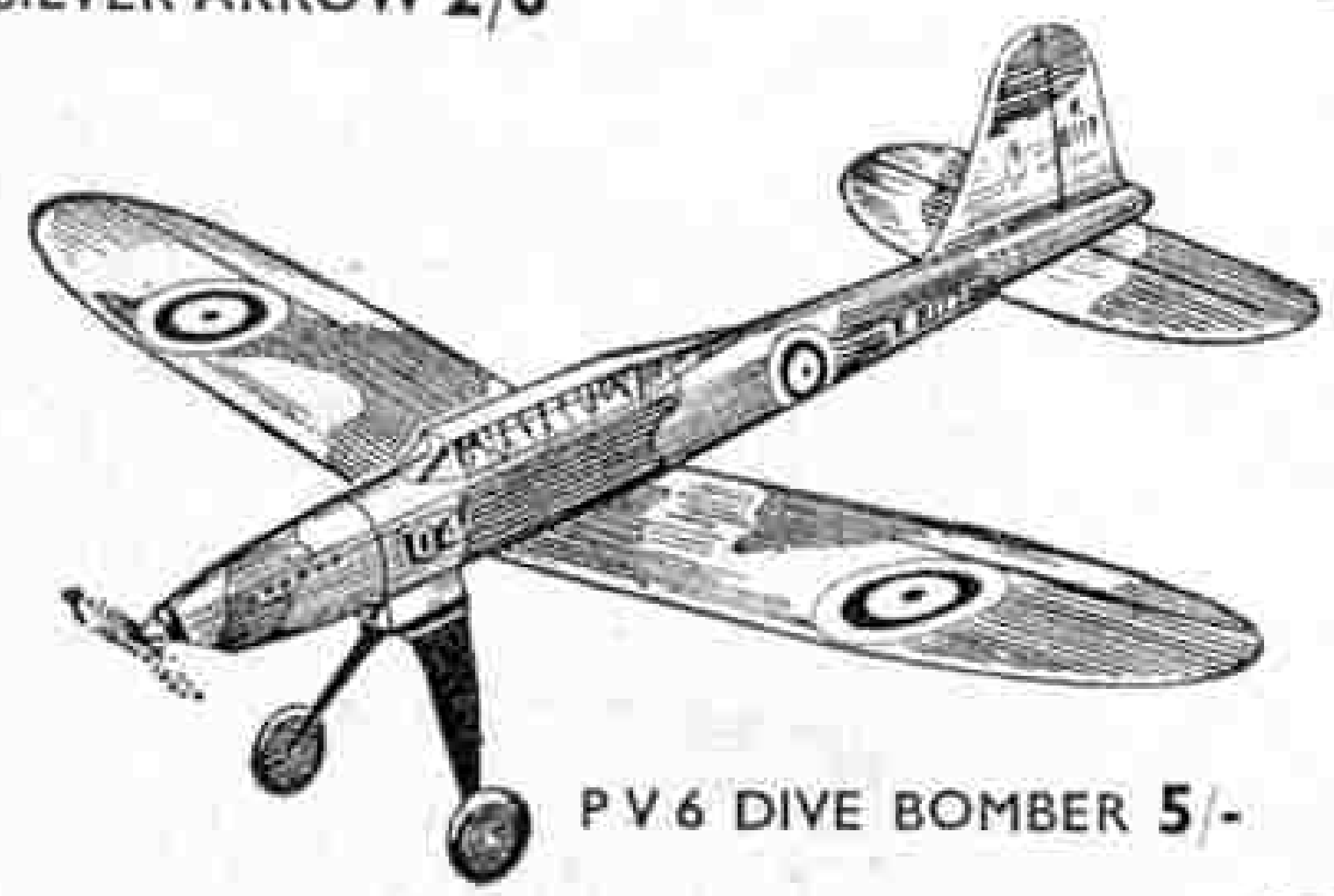


SILVER ARROW **2/6**



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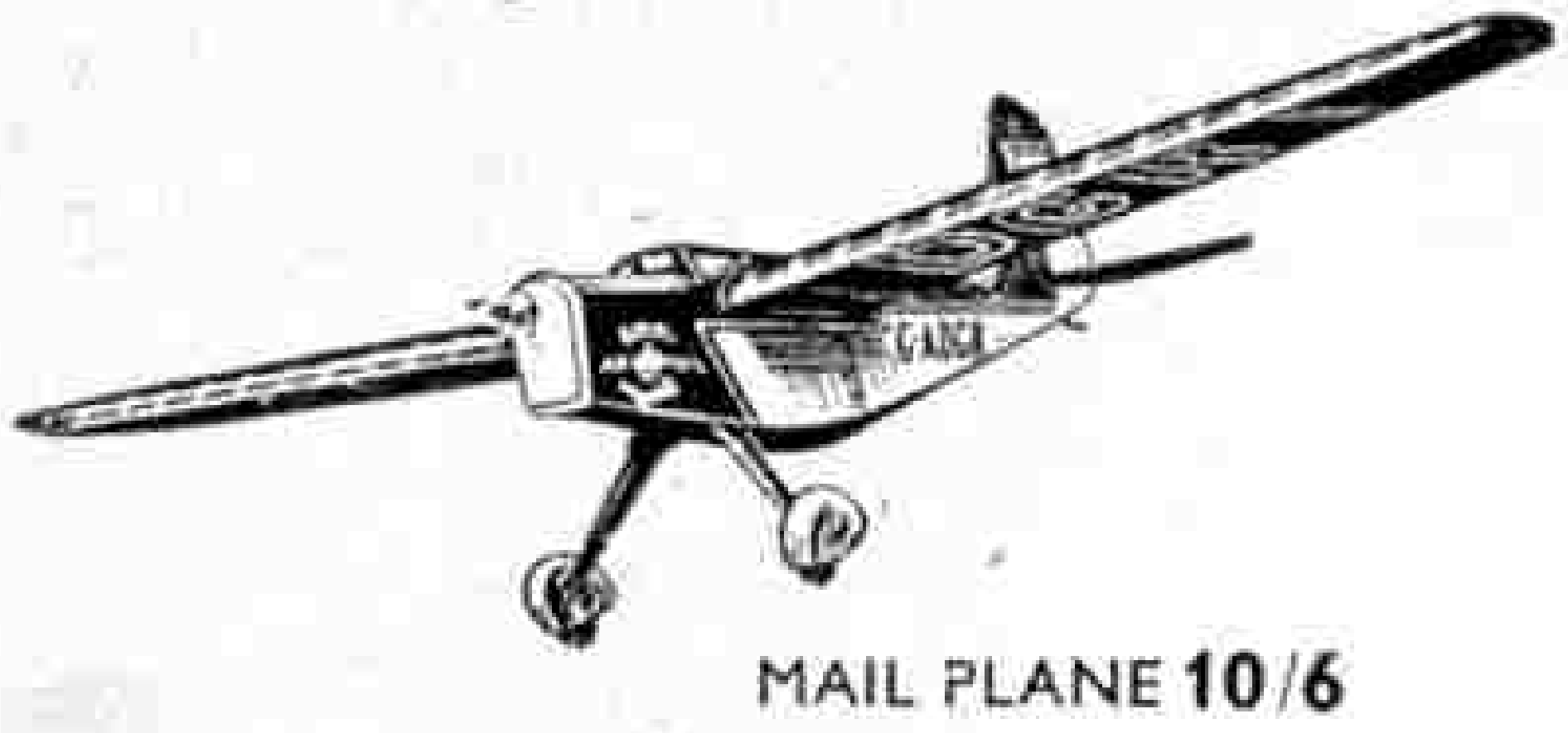

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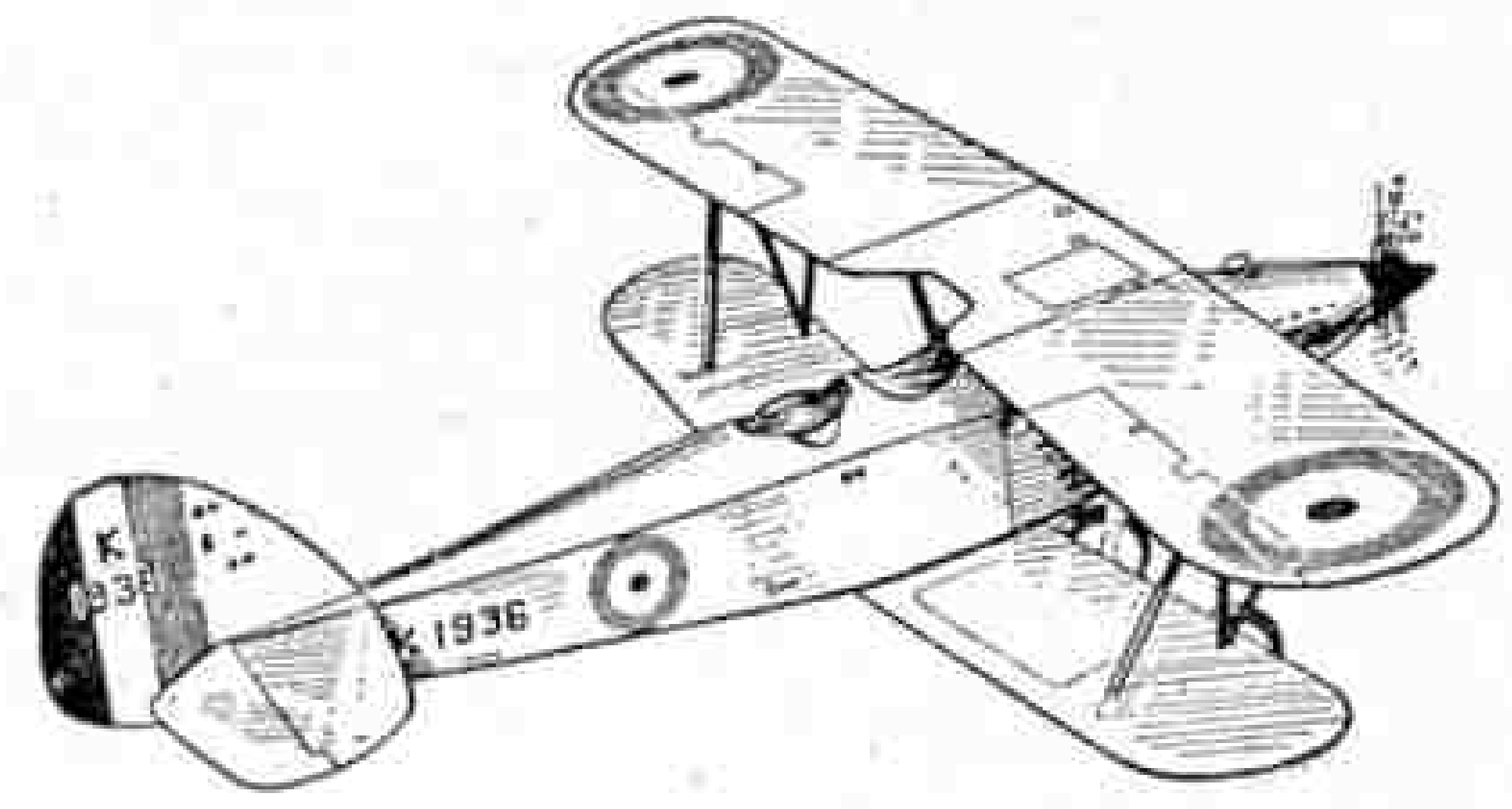
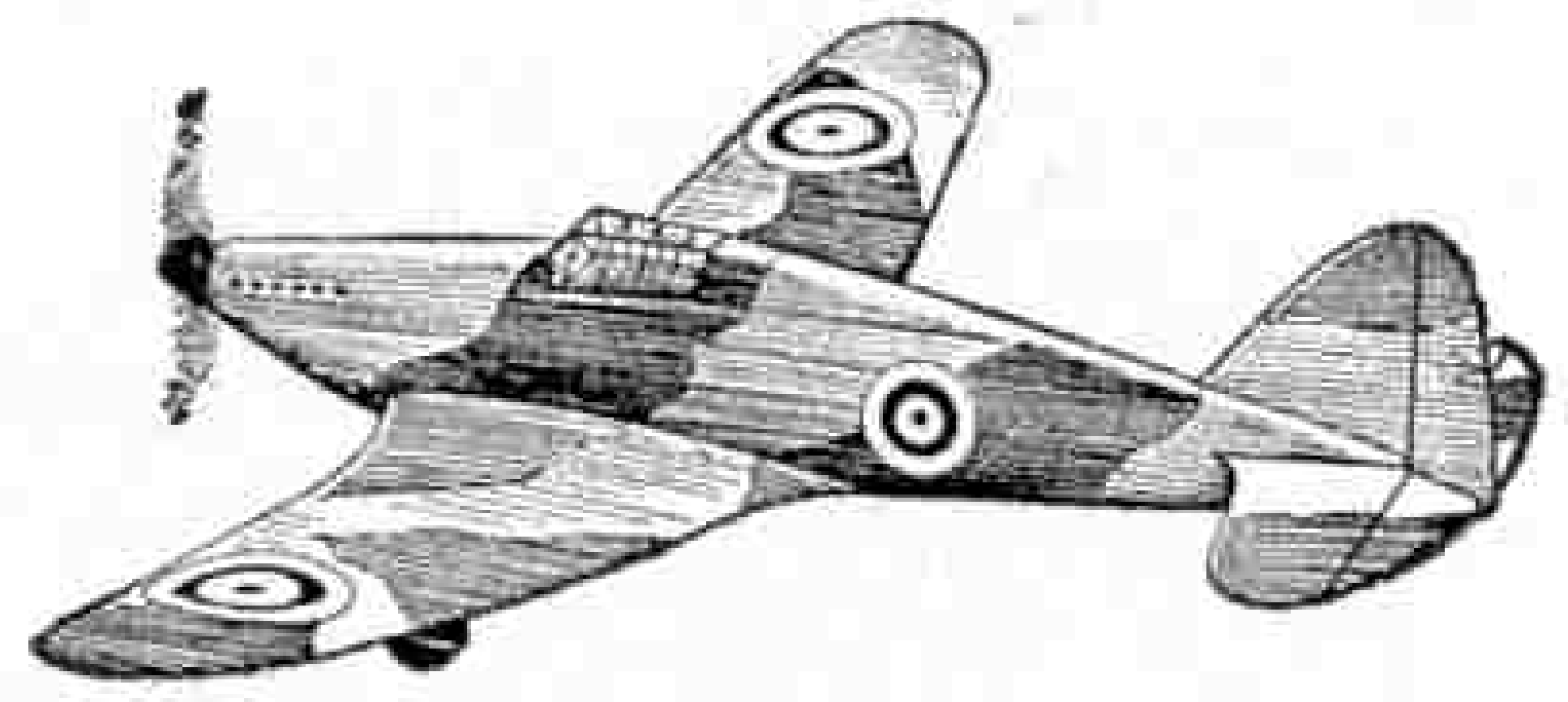


HAWKER DEMON **4/6**



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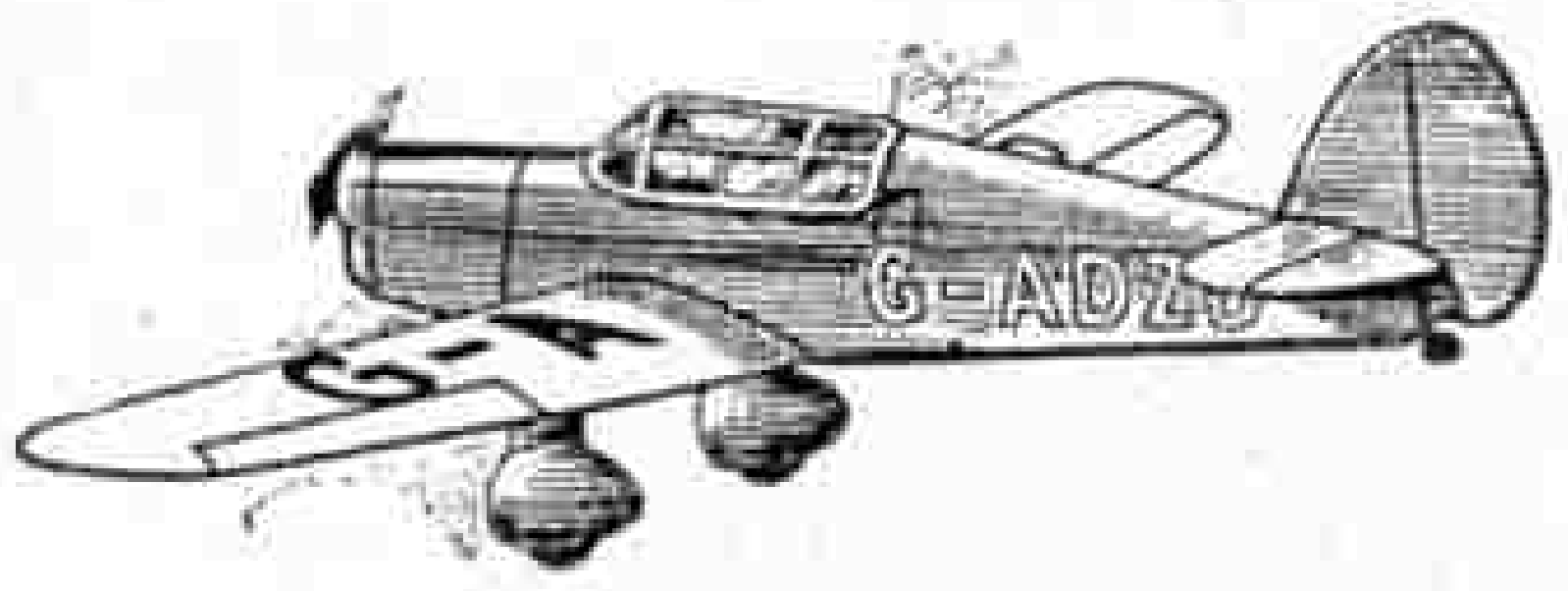

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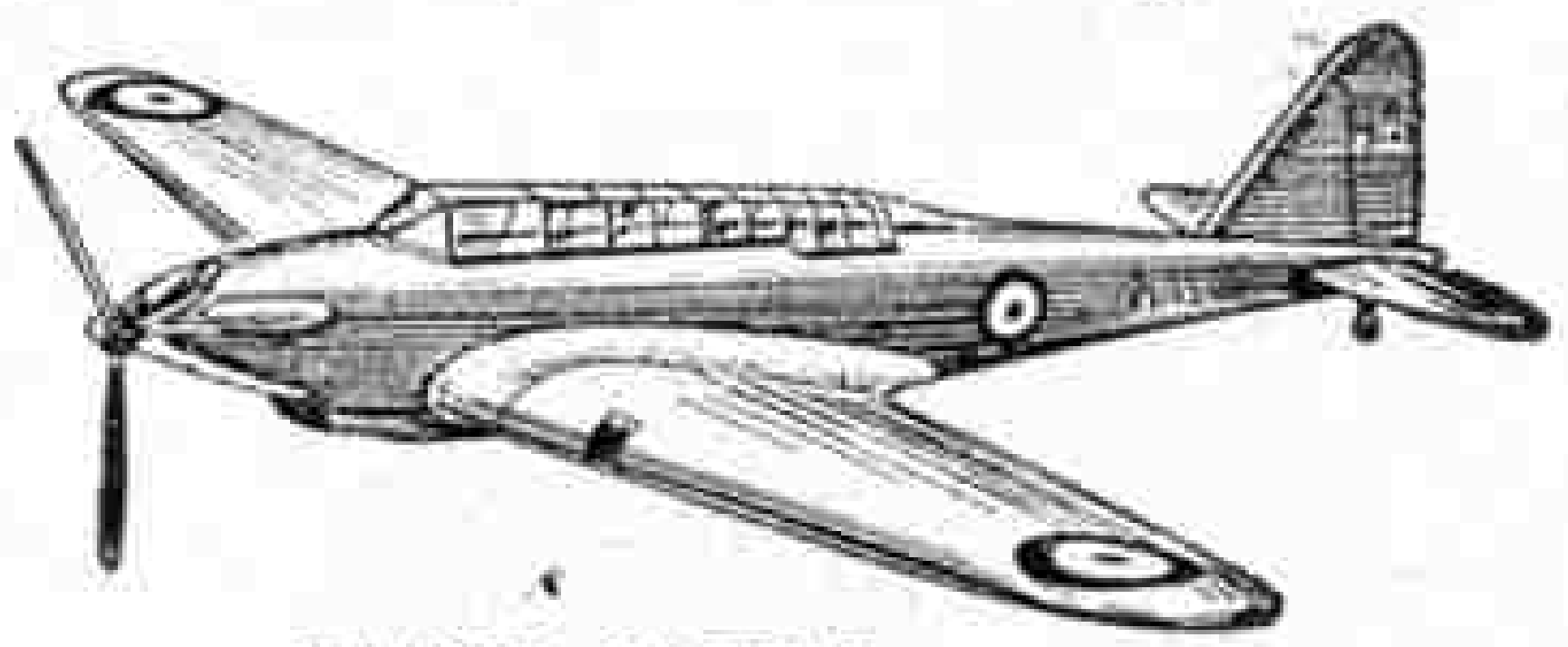

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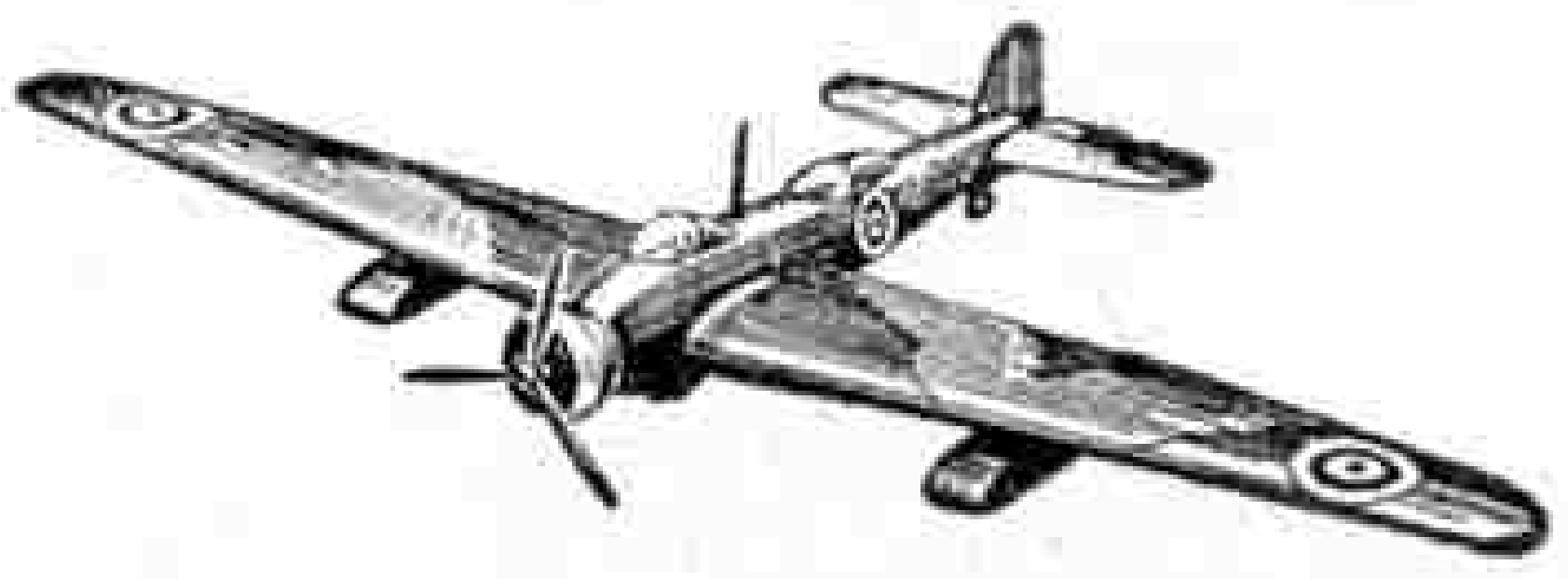

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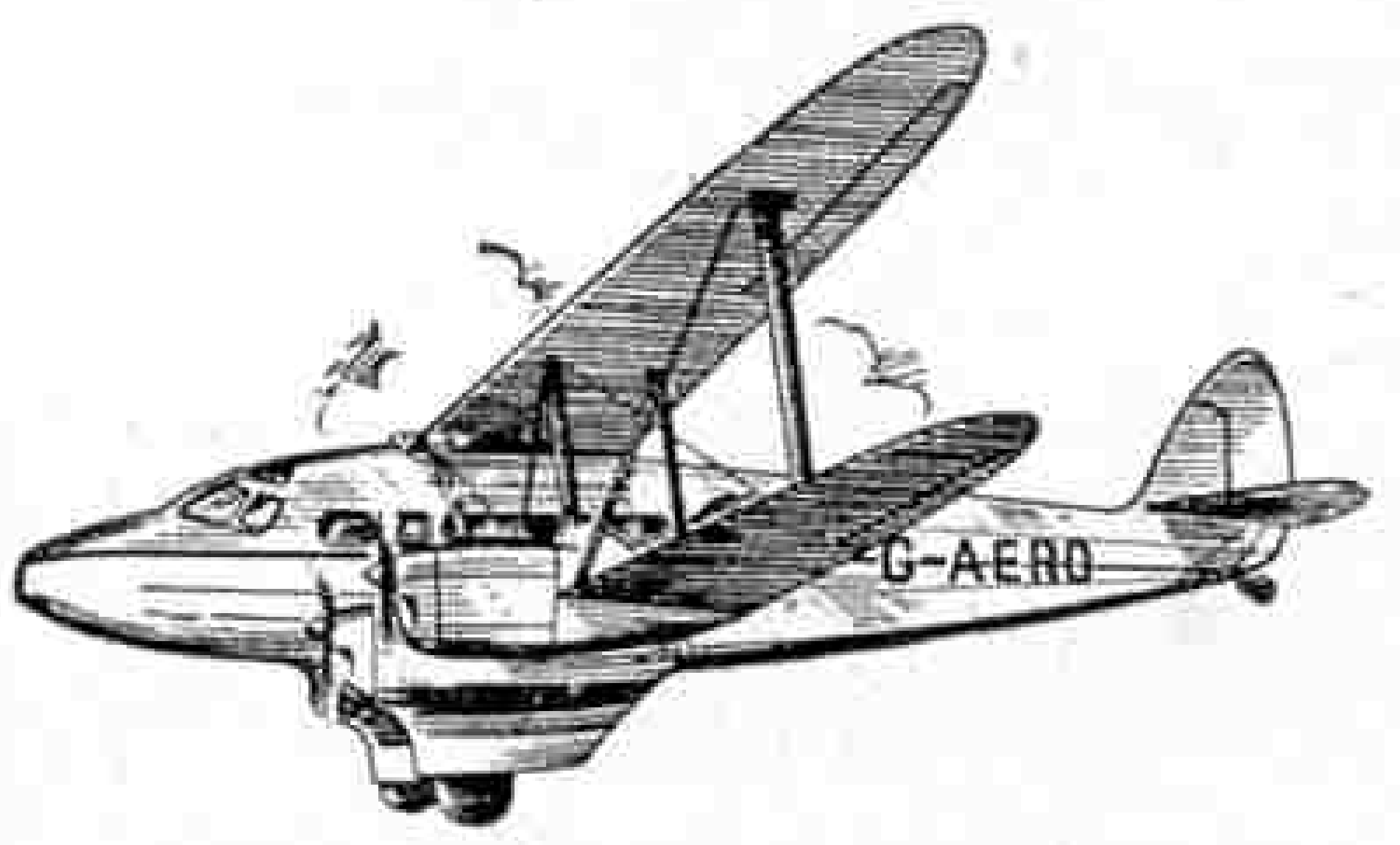

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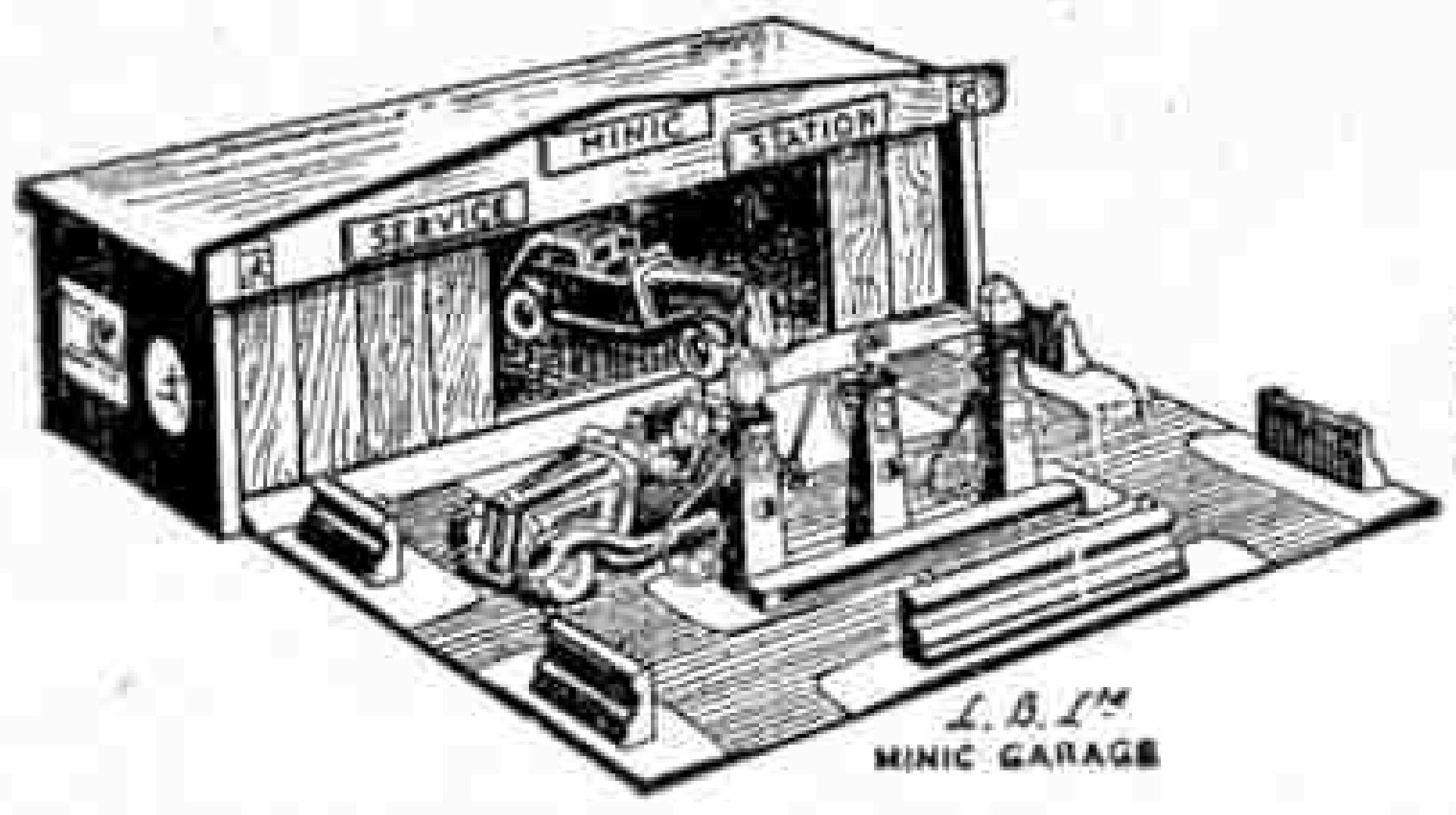

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Realistic new design, fitted with sliding doors and electric light. Equipment includes three large petrol pumps and one large oil cabinet. Light oak finish with folding base.
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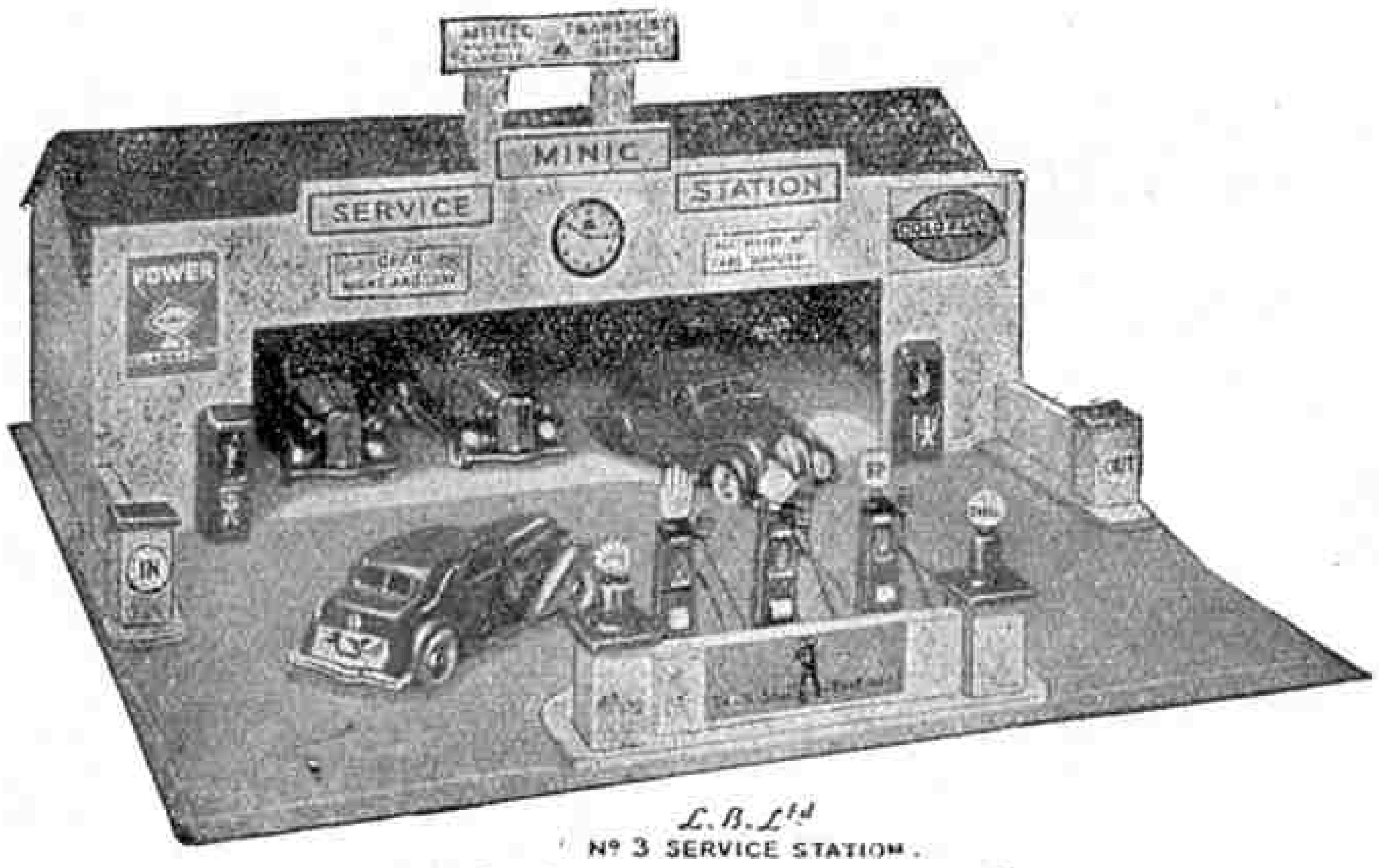

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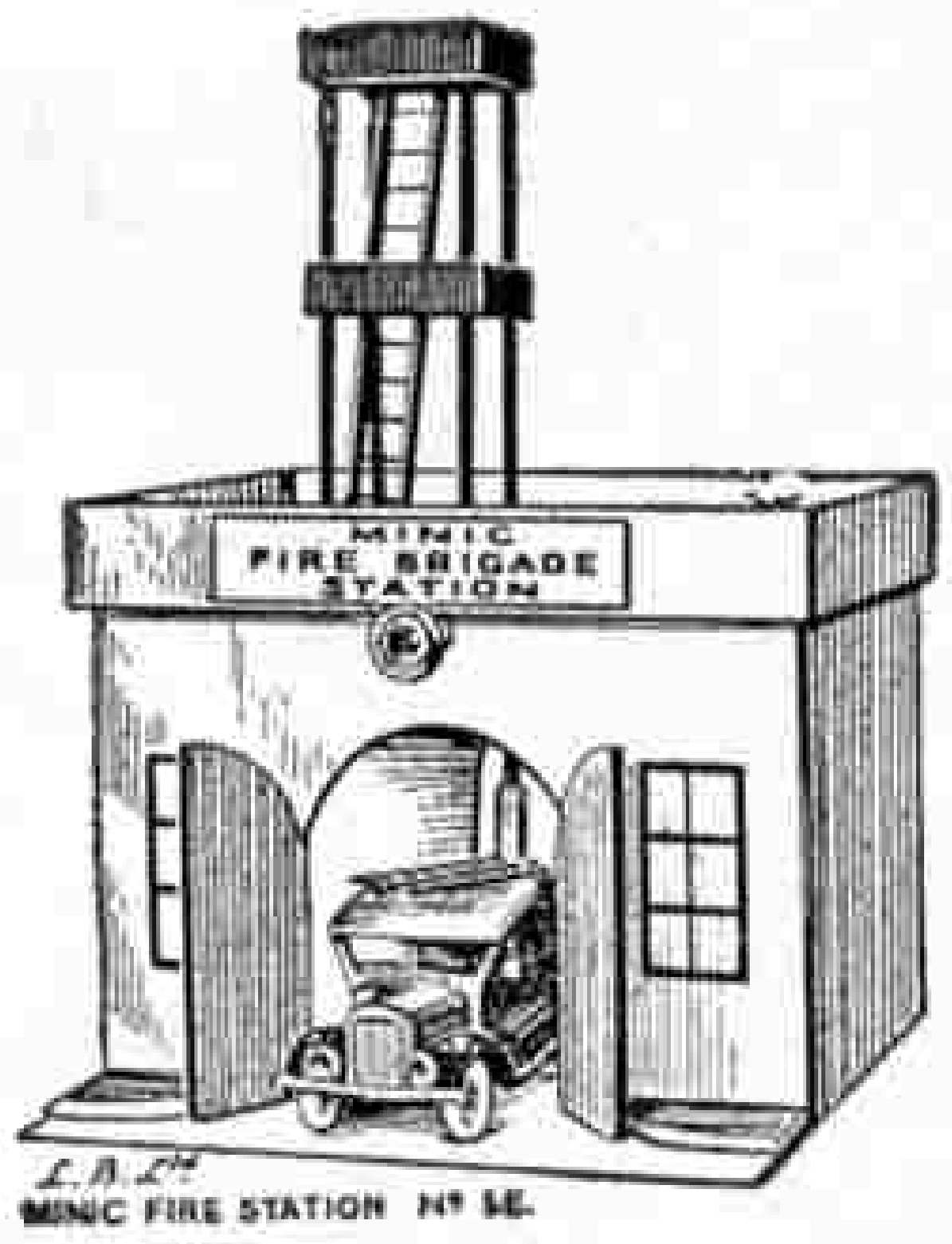

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Fitted with novel mechanical device which releases Fire Engine, automatically lights warning signal and rings alarm. Supplied complete with battery.
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Can also be obtained without warning signal, etc. Price 5/11
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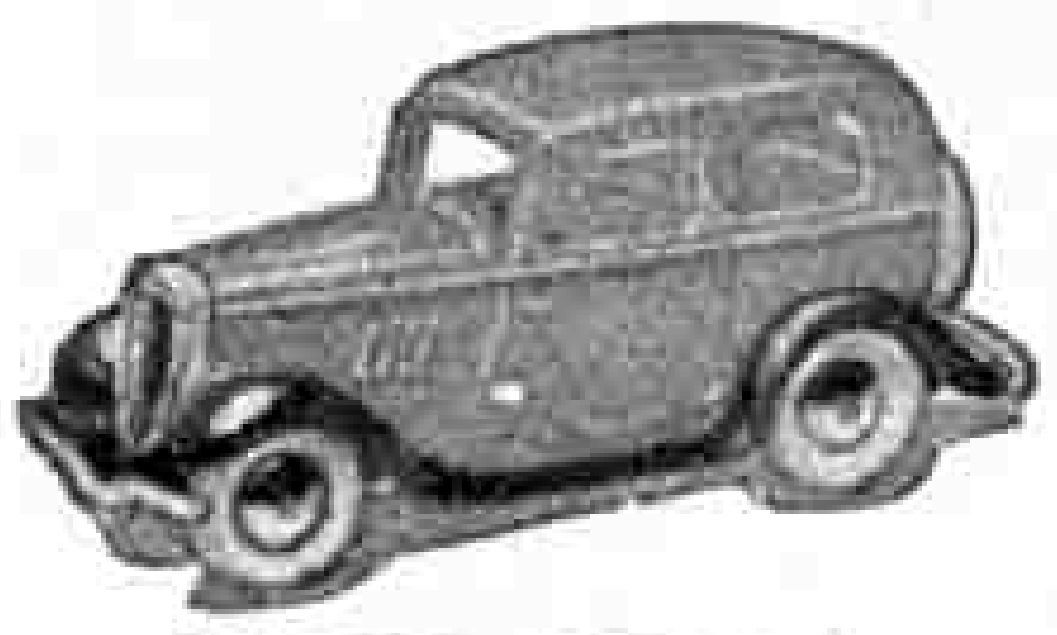

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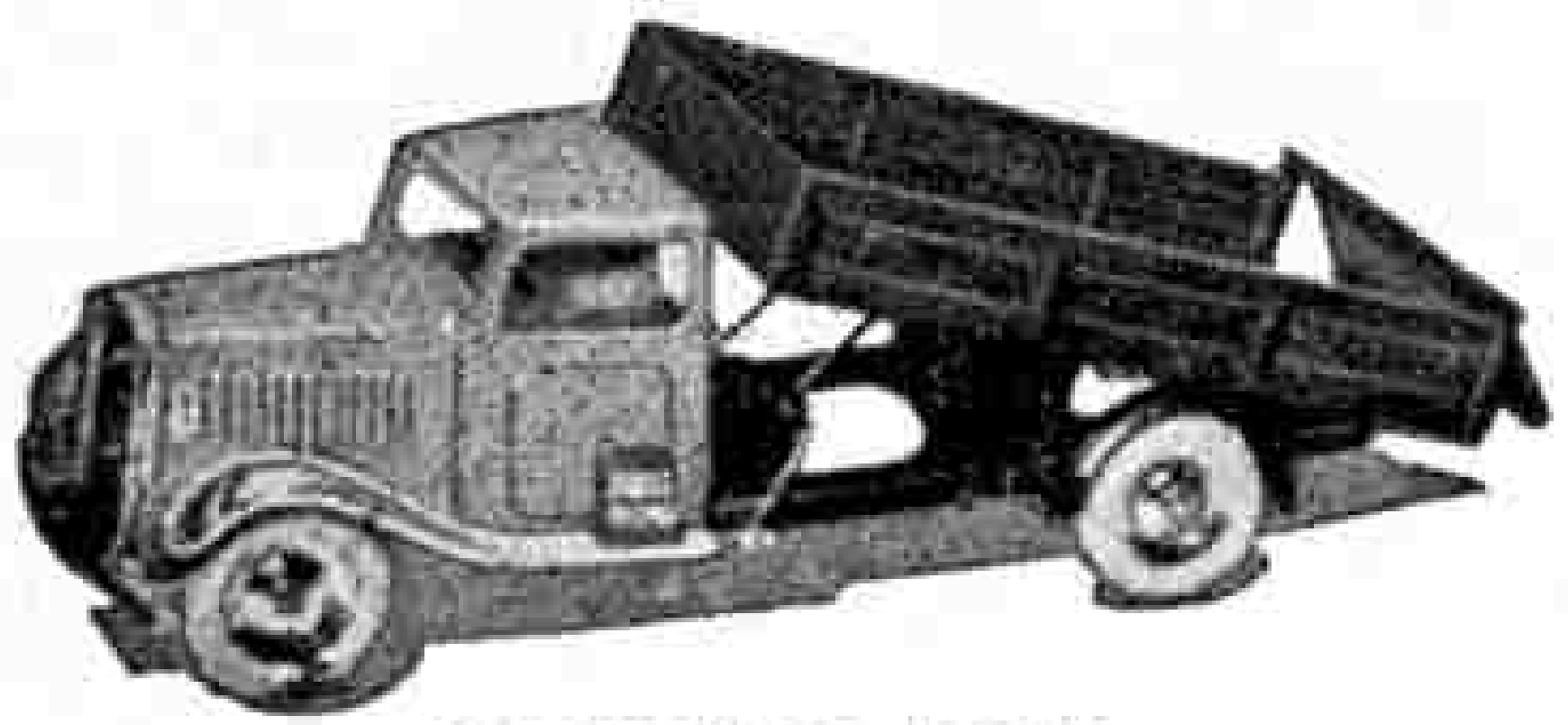

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LENGTH 5¼ ins.
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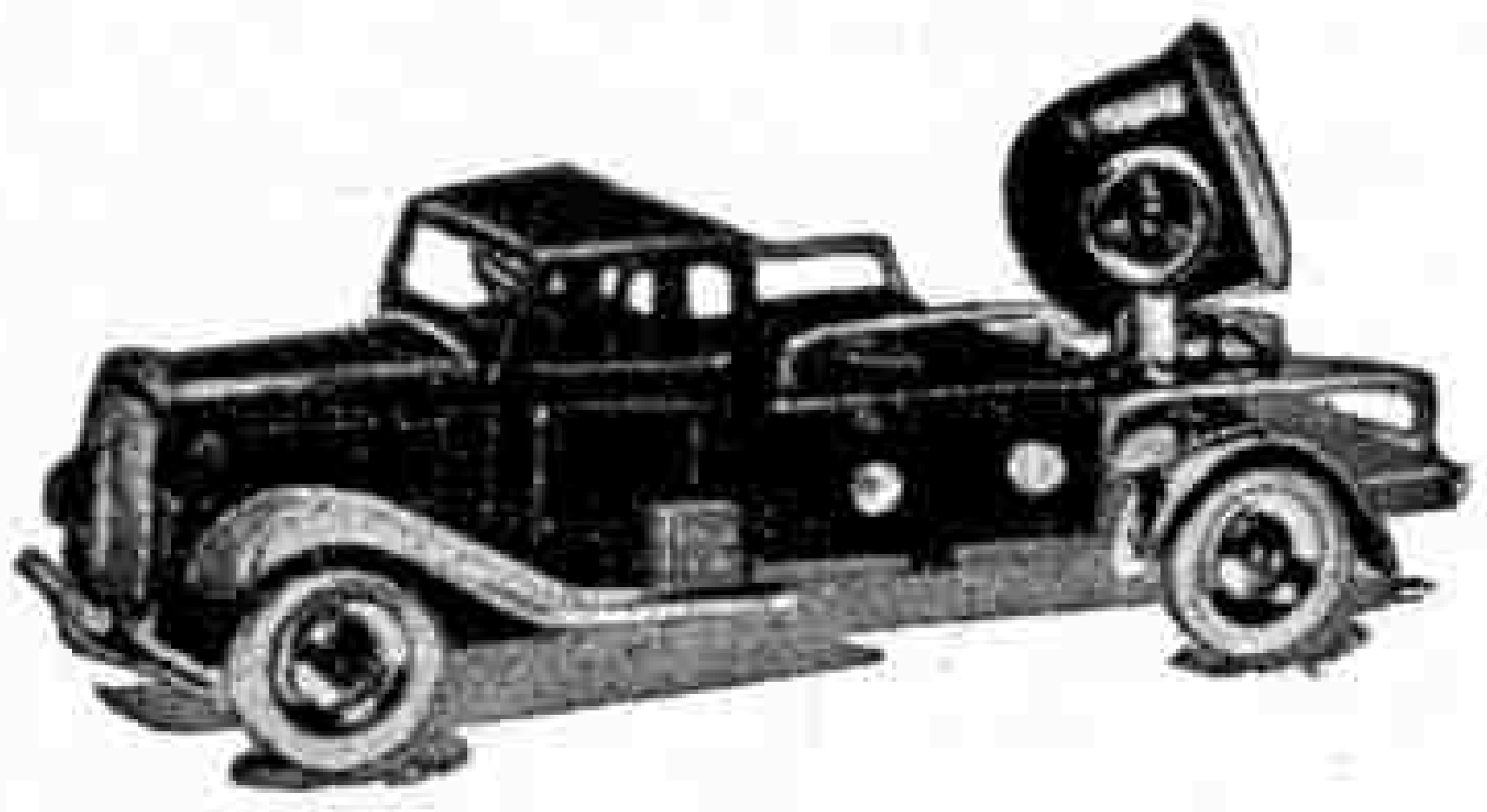

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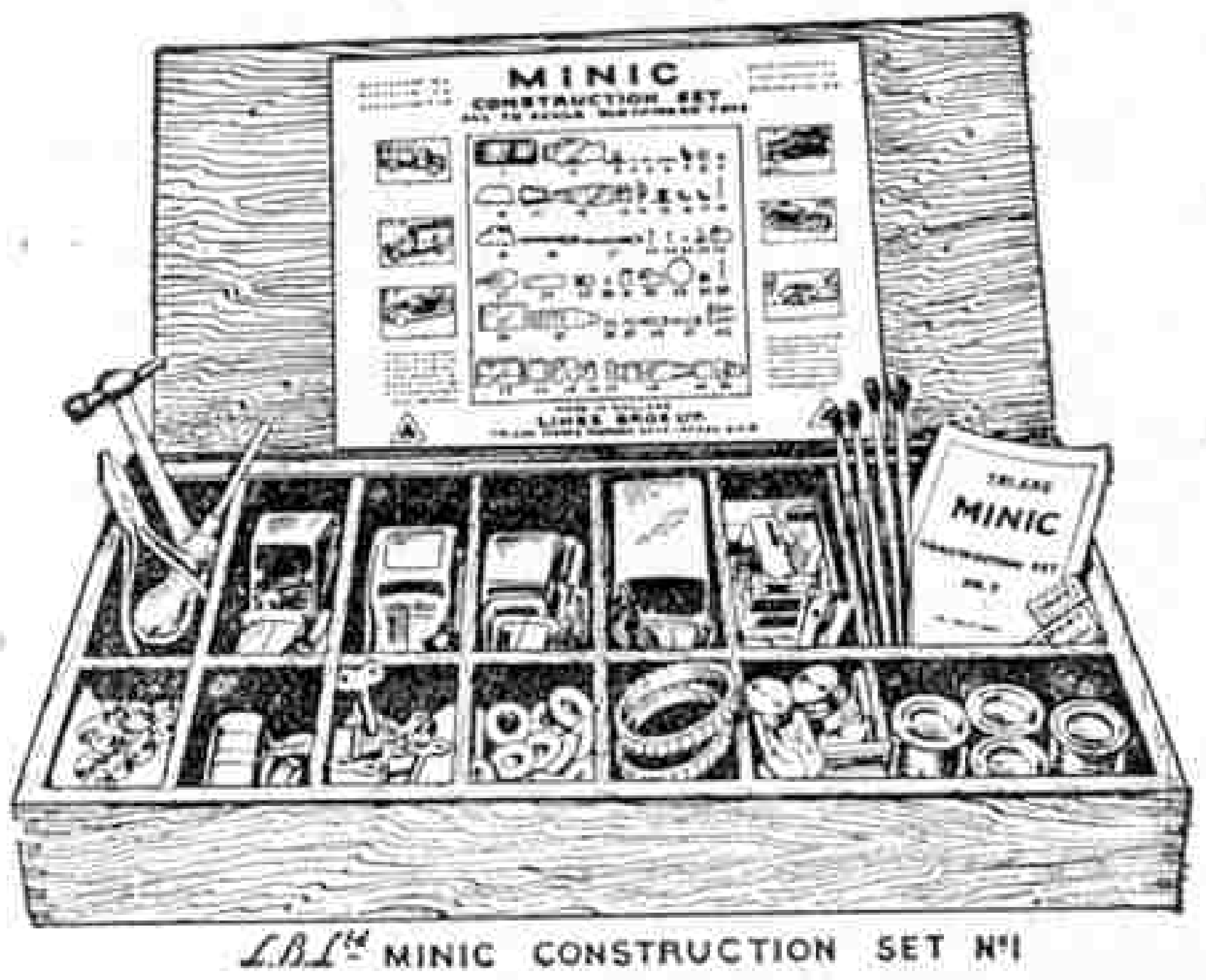

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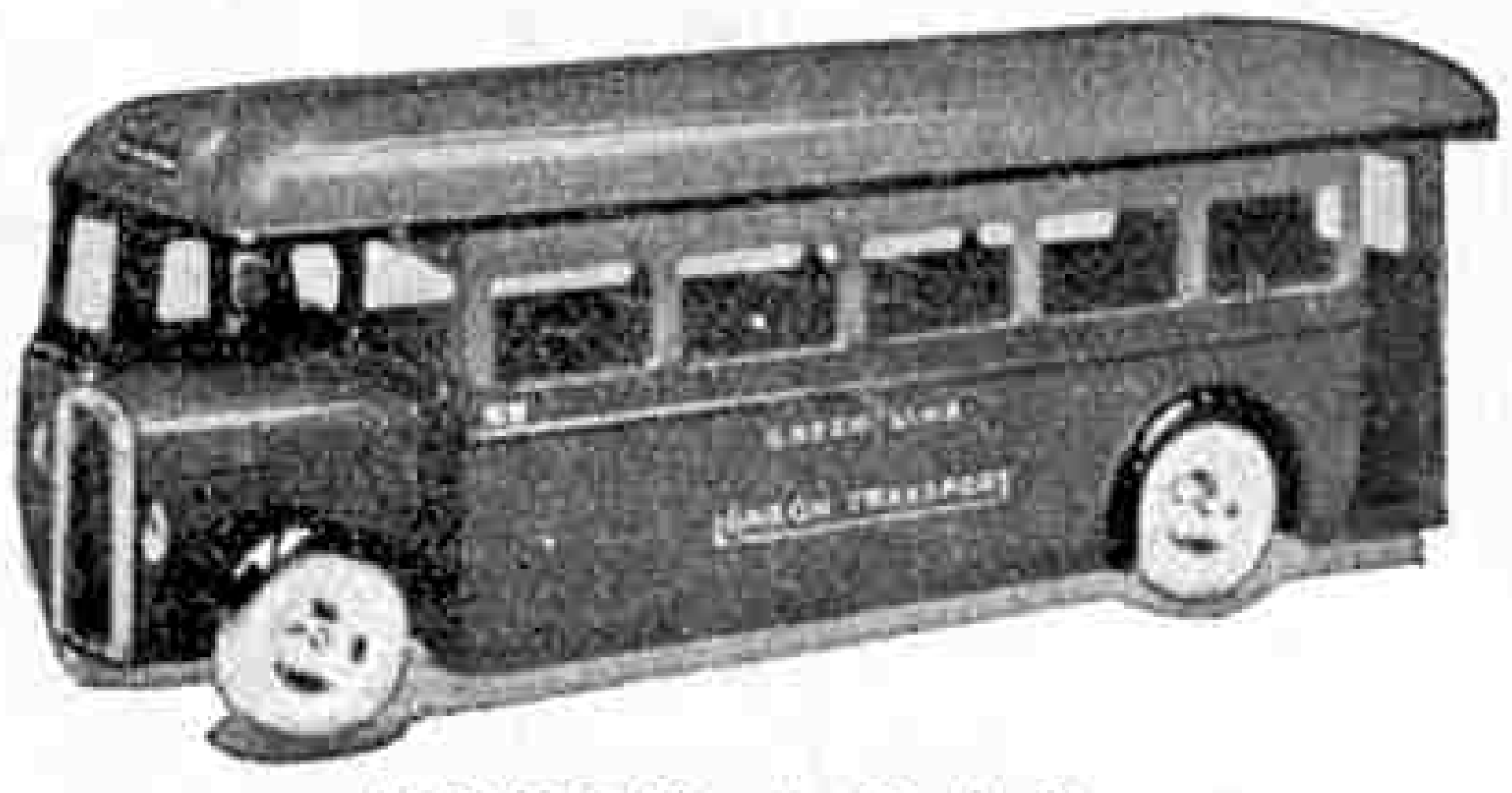
A complete set of parts for making six types of MINIC all to scale clockwork models. All parts, including powerful clockwork motor units, are made with precision tools and machines. Full instructions and tools are included in each set which is packed in a handsome oak finished cabinet 18 ins. x 9¾ ins. x 2¼ ins. Price 15/-



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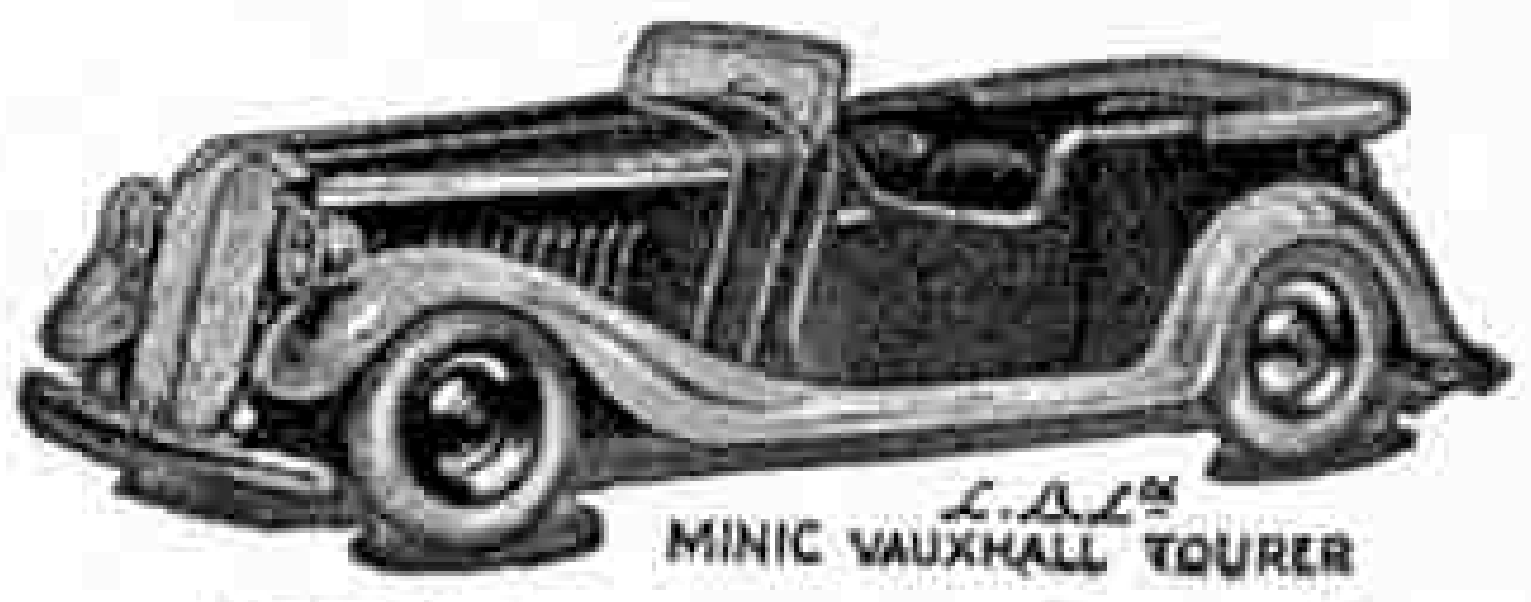
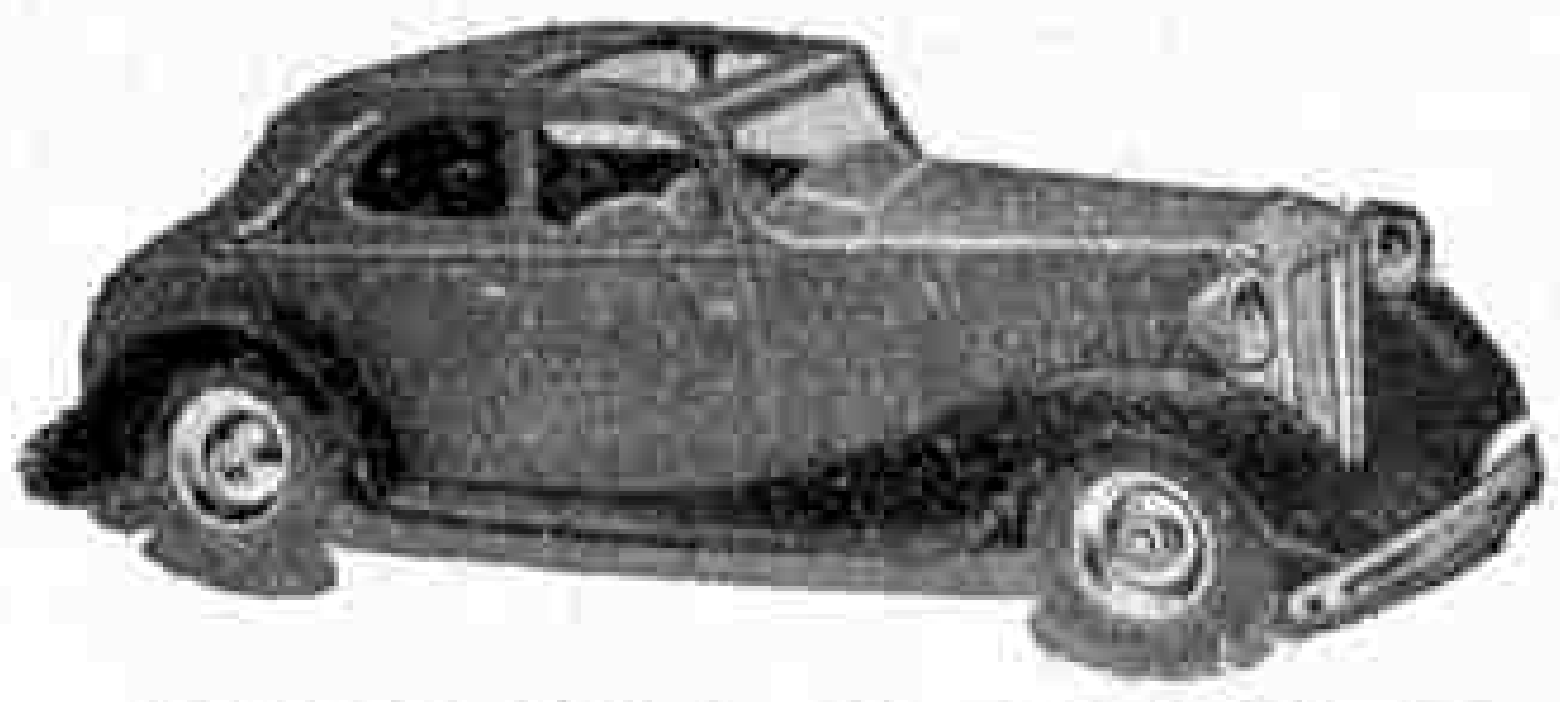


LENGTH 5 ins. Price 1/-

LENGTH 5 ins. Price 1/-



MINIC Daimler Sunshine Saloon
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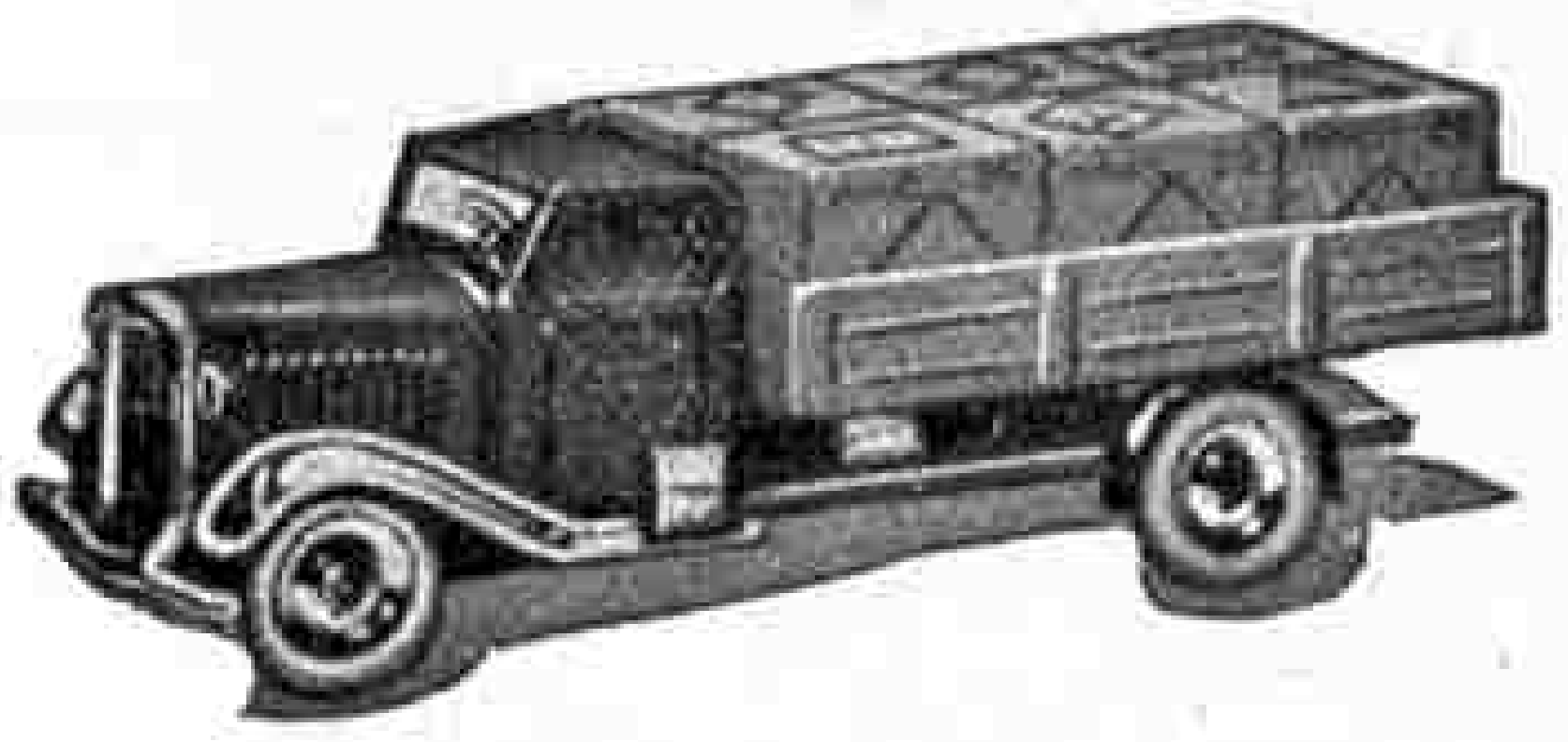
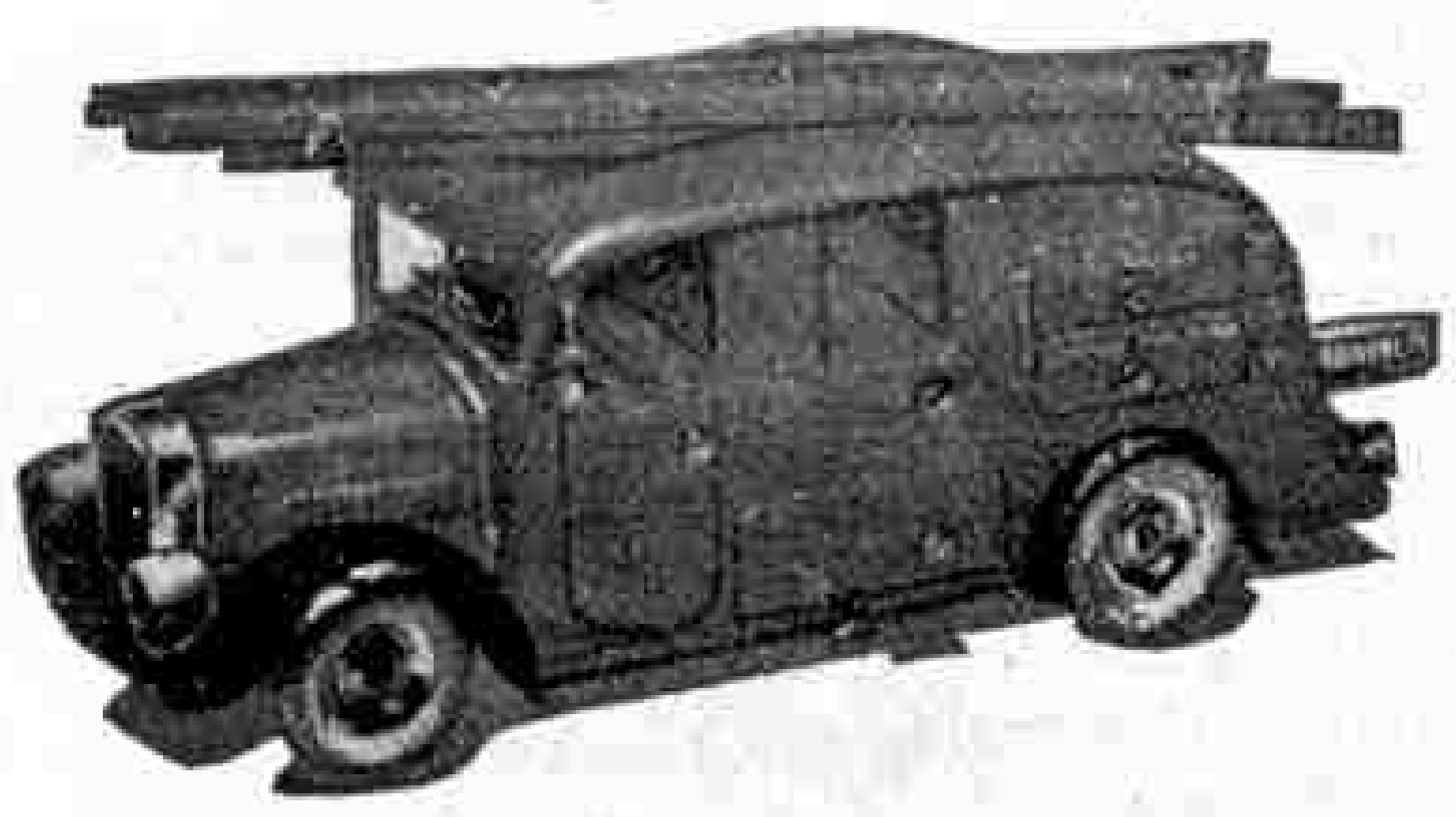


MINIC Lorry with cases
LENGTH 5¼ ins. Price 1/6



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NEXT MONTH: "LAND CREATED BY EARTHQUAKE." PUBLISHING DATE: 1st OCTOBER

MECCANO MAGAZINE

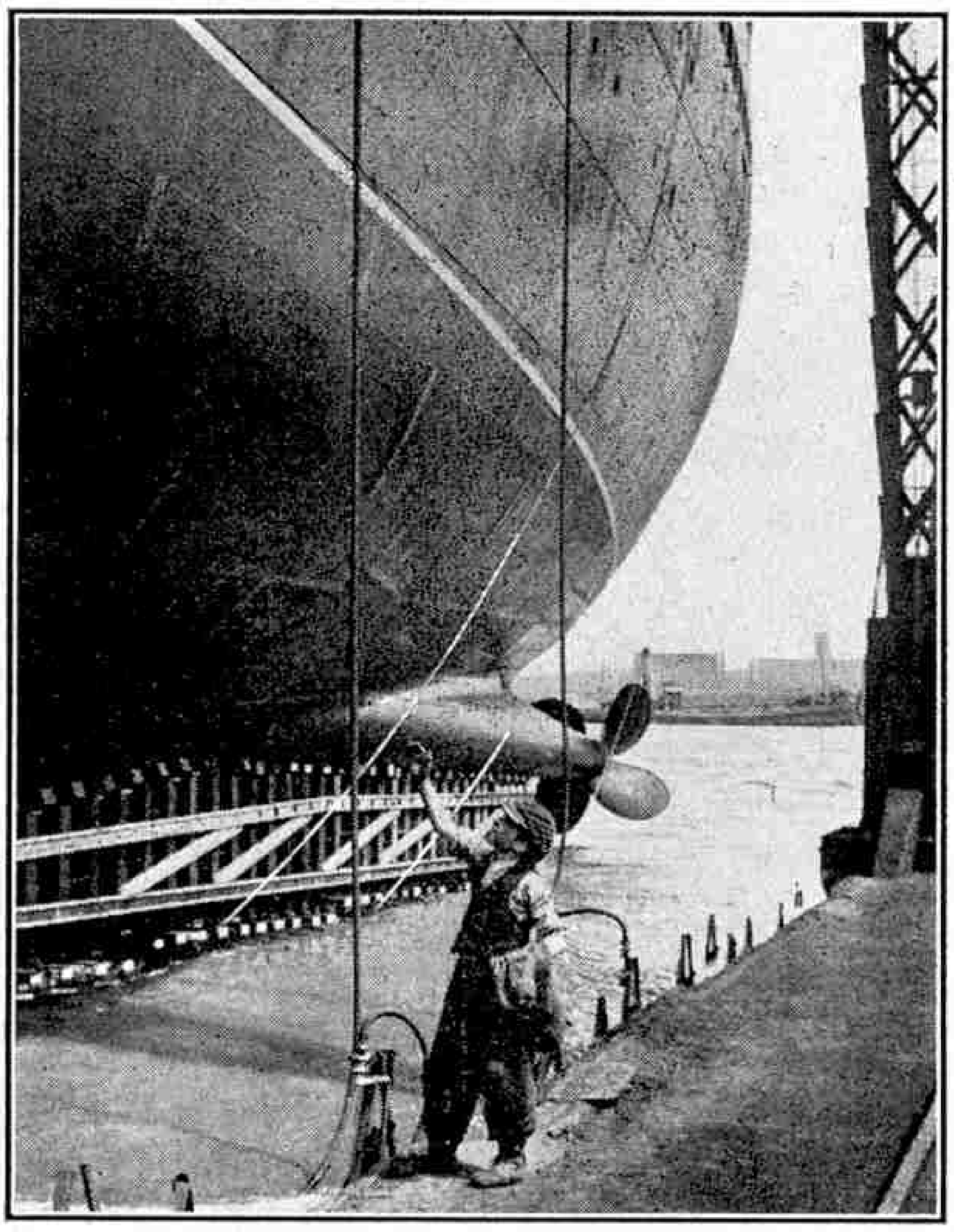
Editorial Office:
Binns Road, Liverpool 13
England

Vol. XXIII. No. 9
September 1938

With the Editor

Science and the Human Eye

In his Presidential address to the British Association at Cambridge last month Lord Rayleigh reminded his hearers of the remarkable manner in which science has increased the seeing power of the human eye. Beginning with the simple spectacle lens, dating from about 1280, there came in succession the telescope and the microscope. Finally Lord Rayleigh spoke of the photo-electric cell, or electric eye, which has made television possible.



"Those are my rivets!" A riveter's boy looks proudly up at the hull of the "Mauretania." (See page 495.) Photograph by T. C. L. Hutchinson.

One of the most interesting uses to which the electric eye is put is that of controlling the automatic opening or closing of a door. This control is brought about by means of an invisible beam of light that falls upon the electric eye. When this beam is interrupted by a person walking past, the electrical condition of the eye changes and brings into action compressed air mechanism that operates the door.

In this connection I was amused recently by a story from New York. One day the automatic doors of the lifts of a skyscraper caused consternation by failing to operate in the usual manner; and shortly afterwards on the same day there was an equally mysterious occurrence in a neighbouring restaurant, where a door that was supposed to open only when waiters approached it, started opening when nobody was about. Eventually two men confessed that they had been playing a joke. First in the skyscraper and then in the restaurant they had blown smoke from their cigars in front of the electric eye. This smoke interrupted the invisible light ray to a sufficient extent to bring the operating mechanism into action. In view of the disturbance caused by this amusing escapade, it is not surprising to learn that smoking has been strictly prohibited in the vicinity of the elevators of the skyscraper building concerned.

Notable Events of the Month

Foremost among the interesting events of August was the recapture by the *"Queen Mary"* of the Blue Riband of the Atlantic. On her first trip after her summer overhaul she crossed from Bishop Rock, Scilly Isles, to Ambrose Light, off the entrance to New York Harbour, in 3 days 21 hrs. 48 min., nearly 1¼ hrs. less than the best time of her rival the *"Normandie"* for the same run. Her average speed was 30.99 knots, and her longest day's run was 790 miles, covered at an average speed of 31.6 knots. A record was made also on the return trip, the average being 31.69 knots. The *"Queen Mary"* now holds five records—the highest average speed on each run, the fastest round trip, the fastest crossing on each trip and the best day's run. No special effort had been made to create a record, and the ship actually reached her highest speed of the round trip after passing Bishop Rock on the way to Cherbourg.

Another noteworthy feat was the first direct westward crossing by air between Berlin and New York, made by the *"Brandenburg,"* a Focke-Wulf 200 "Condor" of Deutsche Luft Hansa. With a crew of four men she left Berlin on the evening of 10th August and landed at Floyd Bennett Field, New York, 24 hrs. 59 min. later. The return flight was begun two days afterwards, and completed in 19 hrs. 54 min. The distance covered on each flight was about 4,000 miles. The average speed against the wind on the westward flight was about 159 m.p.h. and that in the return direction about 207 m.p.h. The navigation throughout appears to have been remarkably efficient, and the quality of the machine is shown by the fact that the return flight could be commenced after such a short interval. This is a definite triumph for German aviation.

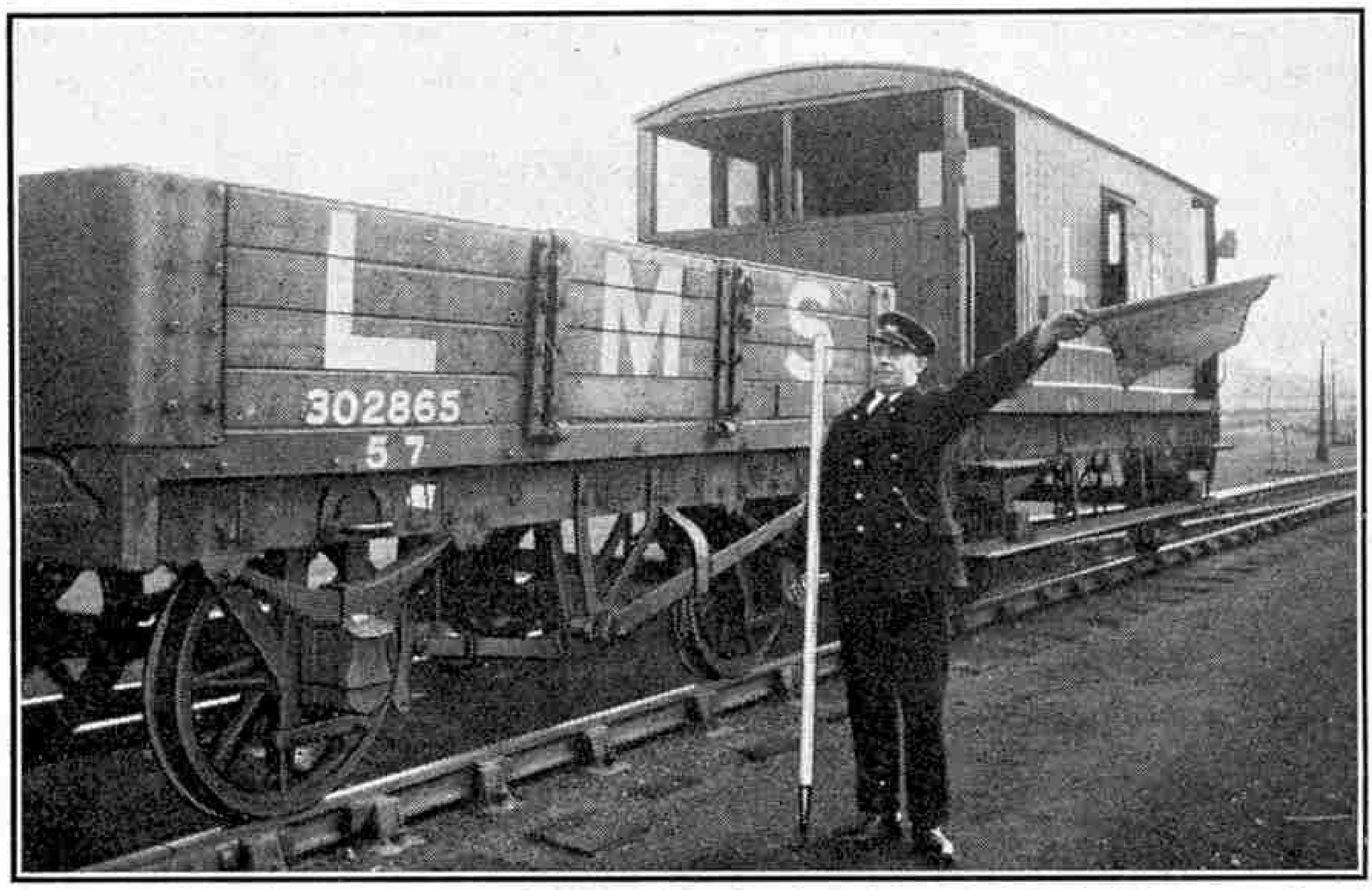
Safeguarding the Nation's Freight

A Day in the Life of a Goods Guard

By D. S. Barrie

To a certain extent the engine-driver's job is coloured with a traditional romance, and railway progress in recent years has brought into the limelight the men who are responsible for the safe and speedy working of our fastest expresses. On the other hand little is known generally of a class of railwaymen who are in a large degree responsible for the safe custody and increasingly rapid transport of the nation's freight, the Goods Guards.

The Goods Guard would be the last to call his job in any way romantic, yet he would be the first to contradict the popular conception of his day's work, that he is hauled about the country in a reasonably comfortable van attached to the rear of a relatively slow-moving train. No impression could be farther from the truth. The demand for increasingly rapid freight transits has led to a speeding-up of freight traffic of all kinds, in which the active co-operation of goods engine-drivers, guards and shunters is an essential factor. A necessary feature too of the speeding-up process has been the fitting of large numbers of goods vehicles with automatic vacuum brakes.



"Right away!" Before giving the signal to proceed the Guard must see that the train is in order and must carry out other duties. Photographs to this article are by courtesy of the L.M.S.

When we remember that every single ounce of the 363,000,000 tons of merchandise and minerals traffic carried annually by the British railways must move in the charge of Goods Guards, it is scarcely surprising to find that there are some 14,000 members of this grade employed by the main line railways as a whole. The L.M.S. alone employ about 6,500 Goods Guards, providing for their accommodation 5,492 brake vans.

The latest type of vacuum-fitted 20-ton guard's brake van used for fast freight services on the L.M.S. Railway is stoutly constructed with steel underframing and body framing. A special feature is the provision of a wheelbase of 16 ft., the total length over buffers being about 27 ft., in order to provide maximum comfort in riding at relatively high speeds. At each end of the vehicle is a verandah, enabling the guard to exchange signals and to change the tail and side-lights as required, while the central part of the van is fitted up as an "office on wheels." On each side of the van is a projecting lookout, extending slightly outward from the body in the form of a bay window, with windows enabling the guard to look either forward along the train, or backward, without having to move from the comfortably-padded seat that is let into the projection. The "office" is also fitted up with writing-desk, tables, lamp-tray, stove for interior heating and for warming food, and even specially-designed devices for holding labels and timetables respectively. Needless to say the van is fitted with the hand-brake as well as with the vacuum brake, the wheel for operating the former being fixed between the two lookouts, in the centre of the floor.

For controlling heavy goods trains on steep gradients, an interesting type of 40-ton brake van was evolved by the L.M.S. some years ago. This van, which is carried on two four-wheeled bogies, has a special type of quick-acting screw hand-brake producing a brake-power equal to 80 per cent. of the gross weight of the vehicle, and capable of holding a 350-ton train on a gradient of 1 in 100.

The extent of the freight speed-up on the L.M.S. alone can be gauged from the fact that in 1931 there were in operation 173 trains conveying vacuum-fitted vehicles; now there are 333. These L.M.S. trains are divided into various classes according to the number of vacuum-fitted vehicles connected to the engine. There are the fully-fitted trains, usually referred to as *"F.F.1,"* in which every vehicle is connected by vacuum brake pipes. Then there are the partially-fitted trains with one-third or more of the vehicles vacuum-fitted; these are known as *"F.F.2."* In addition there are those that have at least four vehicles, and up to one-third of the total number vacuum fitted; these are invariably designated *"Maltese Cross"* trains because they are indicated by a Maltese Cross in the Freight Working Timetables. Generally speaking 50 wagons is the largest number that can be worked as one train with the automatic vacuum brake in operation throughout.

The maximum speed at which it is considered desirable to run fully-fitted freight trains is about 60 m.p.h.; and with not all the vehicles so fitted, the maximum speed is proportionately lower. Even so, our railways operate a number of fast freight trains timed to make start-to-stop journeys at average speeds in the region of 40 m.p.h., while the L.M.S. alone have 57 regular freight trains making non-stop journeys of between 90 and 191 miles. The latter include the 7.45 p.m. *"F.F.1."* from Camden (London) to Edge Hill (Liverpool), which performs the journey in 4 hrs. 54 min. at an average start-to-stop speed of 38.97 m.p.h.

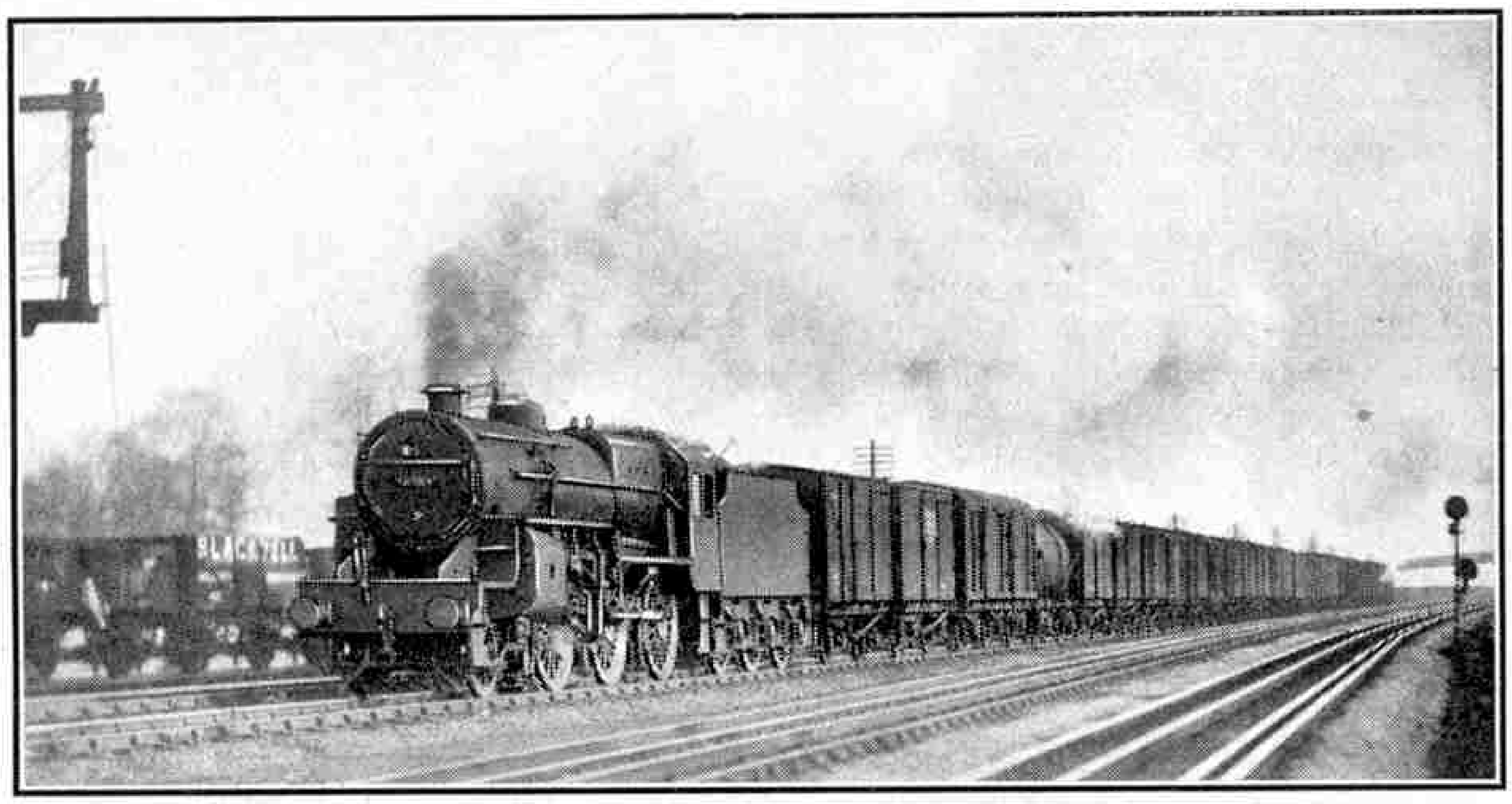
Express freight trains, however, represent only a relatively small proportion of the total freight train mileage. Other services for which Goods Guards must be provided include through mineral trains; "rough" trains conveying miscellaneous traffic from one yard to another; all-stations main line or branch "pick-up" goods; and "trip," or on some railways "target," trains conveying wagons between marshalling yard and goods station, in transfer from one goods depot to another, or to and from private sidings and collieries.

In working this vast and varied traffic the Goods Guard must be prepared to be out in all weathers, for he spends far more of his time in the open than his confrere the Passenger Guard. Apart from the rules and regulations governing his duties, he must "know his road" well, for there are all sorts of local restrictions and peculiarities appertaining to freight working; while a knowledge of the location and respective capacities of the various running loops and refuge sidings is essential to him. Before ever he is allowed out on the line in charge of a train for the first time he has to pass an examination in the numerous Rules and Regulations affecting his job; on the L.M.S. such examination is repeated at intervals subsequently. Goods Guards must also know the numbers of empty and loaded wagons respectively, that the different classes of engines are allowed to work over the various sections of line.

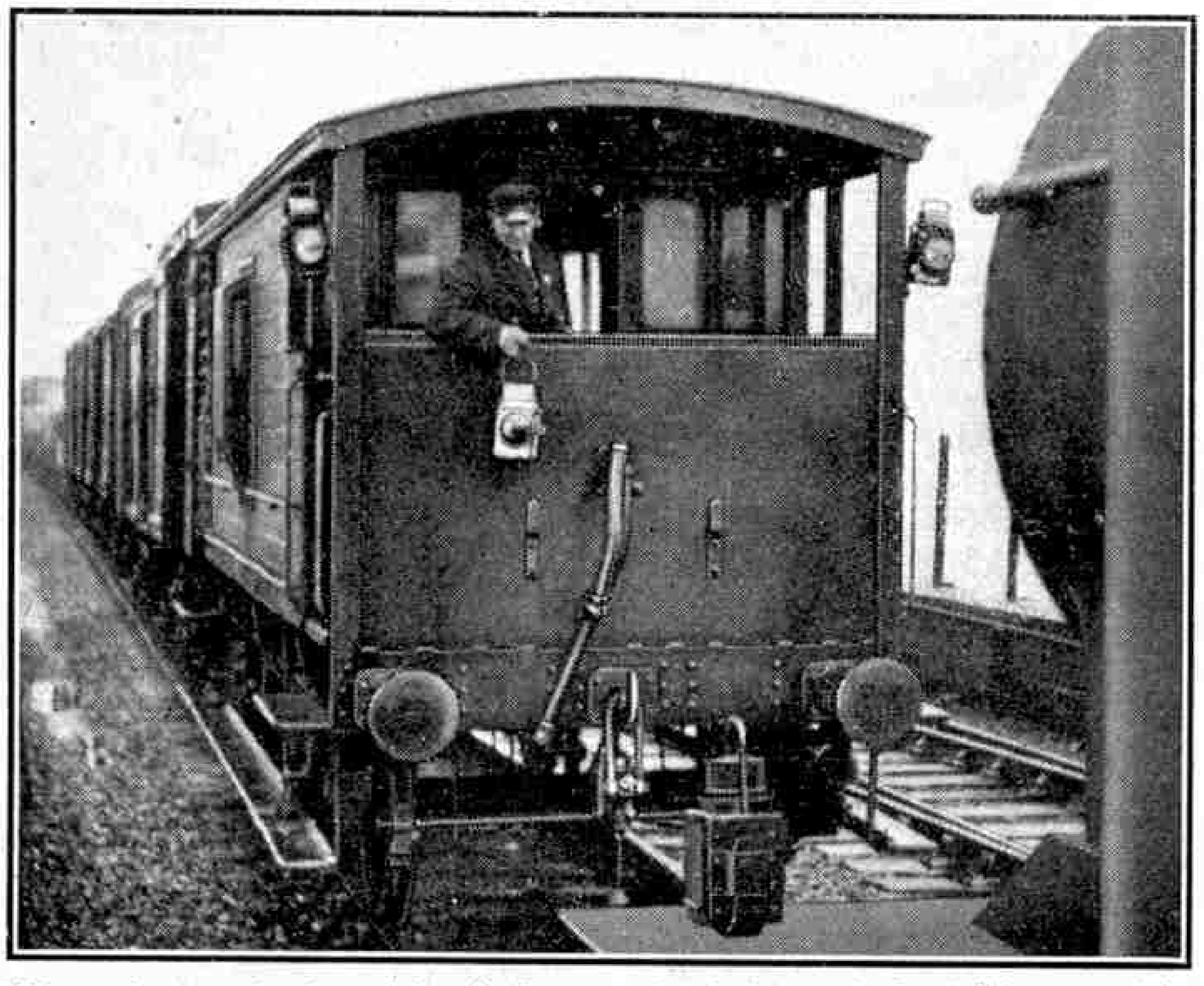
It would take far too much space to enumerate all the rules and regulations involved in the safe and efficient performance of a Goods Guard's duties; we can, however, obtain some idea of his work by spending an imaginary day with him, as I have sometimes done in reality.

At a large goods depot, or marshalling yard, there may be a hundred or more Goods Guards stationed, not only for working trains originating there, but also, in many cases, for re-manning other trains passing through the area. These men, incidentally, usually form a "pool" whence, in the holiday season and at other busy times, Guards can be drawn to work extra passenger trains. The Guards are supervised by the official in charge of a yard or depot; and their regular rosters may be varied and relief working arranged by a separate clerk or clerks.

Supposing that our Goods Guard has to work an outgoing fitted freight train. He "books on" at the office at a fixed time prior to the departure of his train. He then examines the traffic working notices displayed in the Guard's Lobby, and attends to any other matters; possibly "the office" want to know something more about a special circumstance that he reported a few days previously. At the same time he will be notified of his next turn of duty.


A down fitted freight train on the Western Division main line of the L.M.S. The locomotive is one of the numerous 2-6-0s or "Moguls" of Horwich design that are used extensively on this class of train.

Proceeding to the Departure Sidings, the Guard finds his van positioned against the stop-blocks, and his train in course of being marshalled by the yard staff. Assuming that his personal equipment, consisting of red and green flags, detonators, watch and journal, hand-lamp and so on (not to mention lunch or supper!) are "all present and correct," he checks the number of his van and sees that it is fitted with the necessary shunting-pole, sprags, tail and side-lamps, and other equipment. The Guard then proceeds down one side of the train to the engine, taking particular note of any wagons labelled for detaching en route. He sees that all hand-brake levers or wheels are in the "off" position, and checks the security of loads and fastening of all couplings, doors and sheets. Reaching the engine, he checks the load and the booked running of the train with the driver, and then returns to his van down the opposite side of the train, in order to check the doors, sheets and brakes on that side. The importance of this check may be realised when it is stated that there is a case on record of no less than 801 minutes aggregate delay being caused to 35 different trains on an important main line, all because a wagon door was insecurely fastened and part of the load fell out! Should the train be vacuum-fitted throughout, the Guard now checks "vacuum O.K." by means of the valve and gauge in his van.


When a bank engine is assisting in the rear of a freight train the tail lamp must be removed from the brake van. It must be replaced by the guard, as shown in this photograph, when the bank engine drops behind.

Now all is ready, and, assuming that the starting signal is off and a signal has been received from the man in charge of the yard, the Guard gives the "*Right-away*" to the driver by holding his hand, or by night a green light, above his head. A further signal must be exchanged between the Guard and the fireman whenever a freight train is departing from a station, signal, or siding, after having been stopped from any cause whatever, in order that the enginemen may be sure that the train is complete and that the Guard has not been left behind! At night the signal is made by waving a green light slowly from side to side, and during daylight by waving one arm above the head.

In addition to the red tail-lamp, which the Guard must make sure is in position and lit when required, all freight trains carry side-lights on the van. The colour of these, red or white only, varies according to whether the train is running on fast or slow lines, and must be changed according to rule whenever the train passes from fast to slow lines, or vice versa. The tail lamp must also be removed so long as a bank engine is in rear of the train, as for instance from Tebay to Shap Summit on the L.M.S. West Coast Route. Again, when a freight train is shunted after dark, or in foggy or snowy weather, into a siding for another train to pass, the tail and side-lights must be removed, to avoid giving an inadvertent "danger" signal to an approaching train on the adjacent running line.

Provided that his train does not have to do much intermediate working during the course of his journey with it, and provided that no untoward incident occurs, the Guard of a fully-fitted freight train will not have many other duties to perform en route. He must however observe the foregoing and other detailed regulations at all stopping-places. He must also keep in his journal-book a record of the running of the train throughout. The items recorded include the state of the weather, the actual times made, the train-load in wagons between all points, and the number and class of engine, together with explanations of all delays and of any special circumstance. In the event of the latter occurring, a separate report is required as well. Finally, unless his van is disposed of in a siding at the destination, with the hand-brake screwed down and all necessary steps taken to safeguard its equipment, he must not leave it without handing it over to his relief Guard or to some member of the yard staff appointed to look after it.

The job of working a fitted freight train is therefore usually an easier one from the Guard's point of view than that of a mineral, pick-up goods, or other unfitted freight train. With these classes of train the Guard's shunting pole is in use a good deal more often than on a fitted freight. When working over steep gradients, such as in Cornwall, Wales and Scotland, and on many minor branches having stiff "banks," it is often necessary to stop at the top of an incline and pin down a stated proportion of wagon hand brake levers, which are released when the train reaches the bottom. Manipulation of the hand-brake in the Guard's van is also an important factor in the safe and punctual working of other than fully fitted trains. It is part of the Guard's job to assist the driver with his van hand-brake when making stops or in descending gradients, but an over-zealous or inopportune use of it may cause the loads in the wagons to be displaced, or may even lead to a mishap.

In the event of any emergency bringing the train to a standstill, such as an engine failure, the Guard is responsible for taking suitable measures to protect the train from collision in the rear. Having conferred with the enginemen, he examines the adjacent line to see whether the safety of trains passing over it has been affected. If he decides that traffic on this line must be stopped, he sends the fireman forward to place detonators on the rail as a warning. He himself goes back along the line of his own train, not less than three-quarters of a mile if there is time, and places on the line one detonator a quarter of a mile from the train, a second a quarter of a mile farther on, and then at the three-quarter mile distance three detonators 10 yards apart in order to warn the driver of any train that may be following.

By night and day the Goods Guard helps to protect and deliver the myriad articles, raw and manufactured, that make up our national trade. The Guard himself sees little romance in his job, but for the "outsider" there is a thrill akin to that of riding the footplate of an engine, when for the first time you stand on the rear platform of a "Fitted Freight's" brake-van.

Latest R.A.F. Reconnaissance Aircraft

Features of the Avro "Anson"

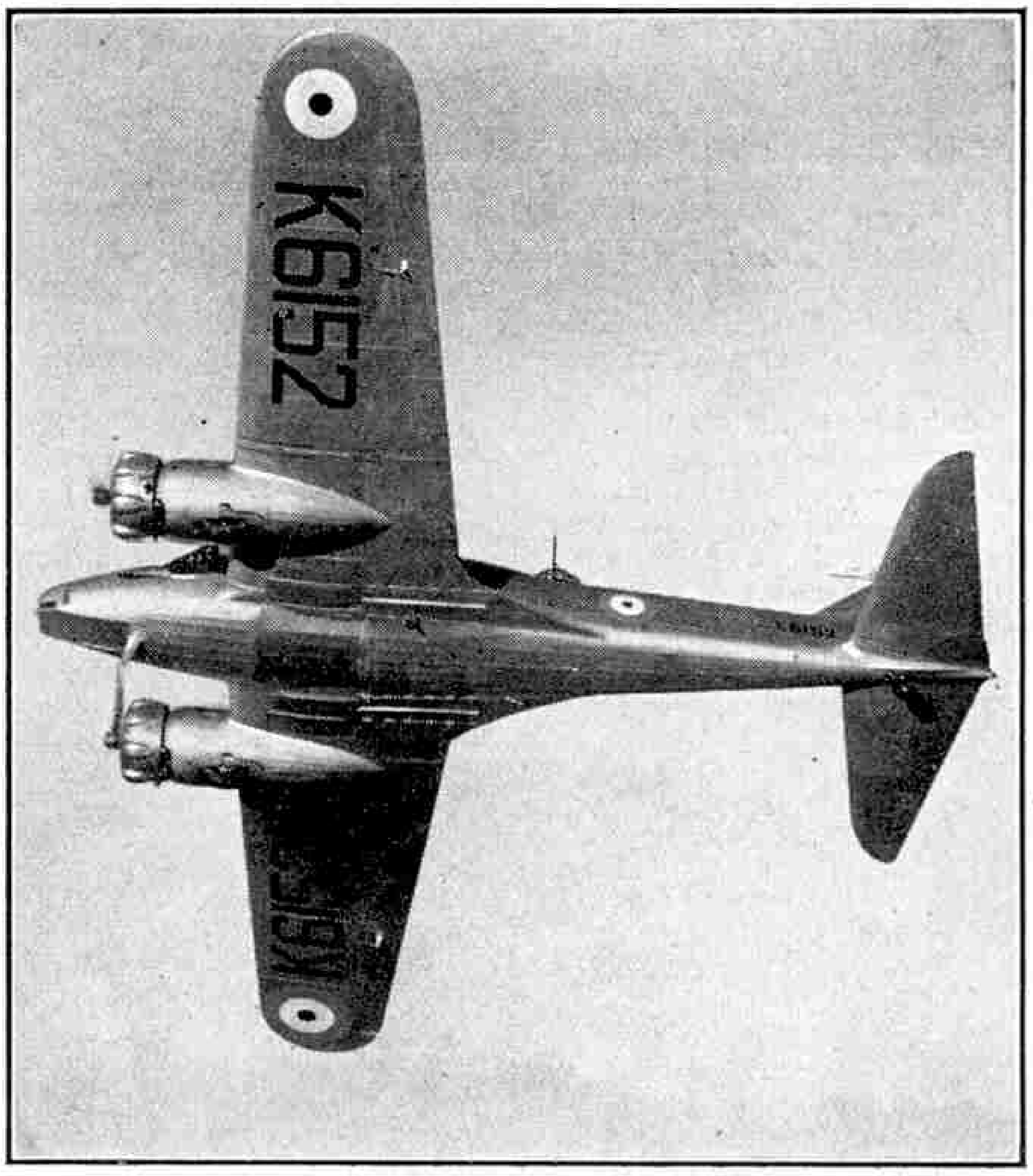
THE defence of this country in time of war would not be limited to keeping a lookout for enemy aircraft and warding them off, but would include also the systematic patrol of our coasts in the search for hostile warships or submarines. This would be done by aircraft. Far out at sea flying boats would be used, but near to the shore reconnaissance would be the task of military landplanes specially designed for the work and operating from coastal aerodromes.

The latest type of reconnaissance aircraft to be acquired by the Royal Air Force is the Avro "Anson" shown in the illustrations to this article, and on our cover by courtesy of A. V. Roe and Co. Ltd., Manchester. It has also been adopted by the flying services of other countries for general reconnaissance duties and for light bombing. In addition to these purposes it can be equipped with quickly removable dual control and used as a trainer, thus providing a useful medium for the instruction of pilots who are intended to fly fast, modern, twin-engined bombing aircraft.

The "Anson" is a twin-engined low wing monoplane with retractable undercarriage. The normal crew consists of a pilot, navigator-bomb aimer, and radio operator-gunner, and they occupy an enclosed cabin of unusually roomy dimensions that allows easy access to the various crew stations. These stations are along the left-hand side of the fuselage, so that the right-hand side is left clear for the passage to and fro of the two members of the crew whose duties necessitate changes of position.

The pilot of course is in front. The flying and engine instruments in his cockpit are mounted where they can be seen clearly at all times, and for night flying they are flood-lit. The flying controls consist of parallel motion rudder pedals, and a vertical column having fore-and-aft movement for the elevators, and on which is mounted a wheel for aileron control. A pedestal conveniently placed for the pilot's right hand carries the engine throttle and fuel mixture controls, the wheel brake operating lever and the tail trimming control. The engine switches are mounted above the windscreen. There is provision for a fixed Vickers gun for the pilot.

The navigator occupies a seat immediately behind the pilot, and has a table containing a drawer for his maps and charts. There is an alternative seat for him immediately to the right of the pilot, and when not in use this seat is folded against the side of the fuselage. The radio operator sits behind the navigator. The radio apparatus is mounted in front of him, and a convenient table is also provided for him. The "Anson" has a fixed aerial, and there are facilities for a trailing one if required. The entrance door to the cabin is aft of the radio operator's station, but on the right-hand side of the cabin, and has a window that opens inward to permit the use of a bearing compass. There is a similar window on the left-hand side of the cabin, and others at corresponding positions near the navigator's seat.



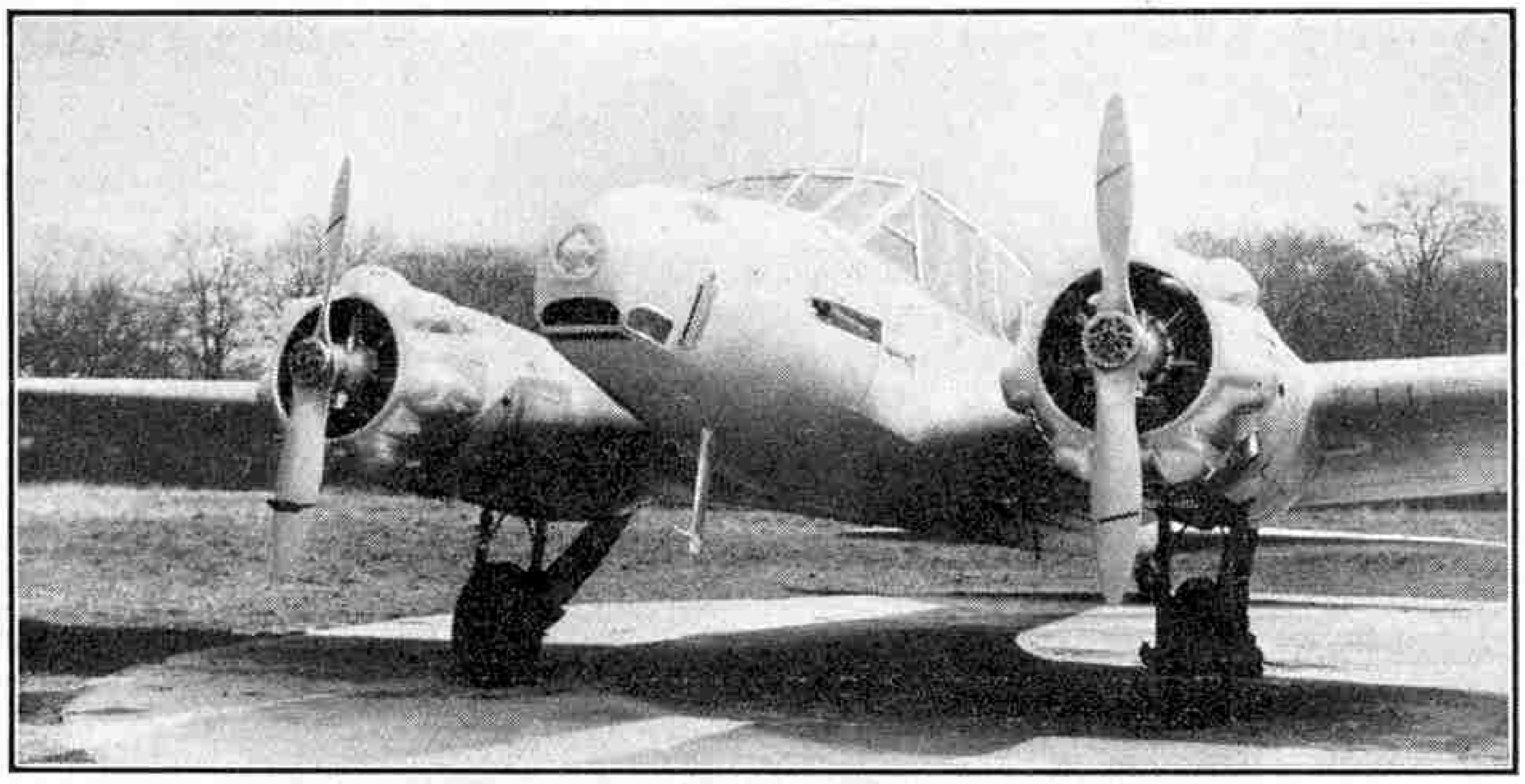
A striking view from underneath of the Avro "Anson." The wheels can just be distinguished in the engine nacelles, into which they are drawn up during flight. Photograph by courtesy of "Flight."

When acting as a bomb aimer the navigator occupies the prone position in the extreme nose of the fuselage that can be seen in the lower illustration on the next page. The course-setting bombsight is operated through a sliding door in the floor, and an adjustable windscreen prevents the entry of air through the aperture when this door is open. The bomber's instruments consist of an altimeter, an air speed indicator, and an air temperature gauge; and the controls for releasing the bombs are conveniently placed to his right hand. The doors of the compartments containing the 100 lb. bombs are opened by the weight of the bombs when these are released, and are closed again automatically; those of the 20 lb. bomb compartments are controlled by a small lever on the right of the pilot. There are also bomb release controls mounted on a panel on the right-hand side of the fuselage, for use by the pilot if necessary.

A small door at the back of the cabin communicates with the rear gun station mid-way along the fuselage. On account of the high speed of the "Anson" this station is provided with an Armstrong Whitworth rotating gun turret, in which the gunner is completely enclosed. He occupies a saddle seat, and is able to use the gun in any position permitted by the structure of the aeroplane. In order to avoid damage to the airscrews when the gun is firing forward, the limit of the field of fire is clearly marked by broad red and black lines on the upper surface of the wing. When not in use the gun is stowed in a deep recess in the top of the fuselage.

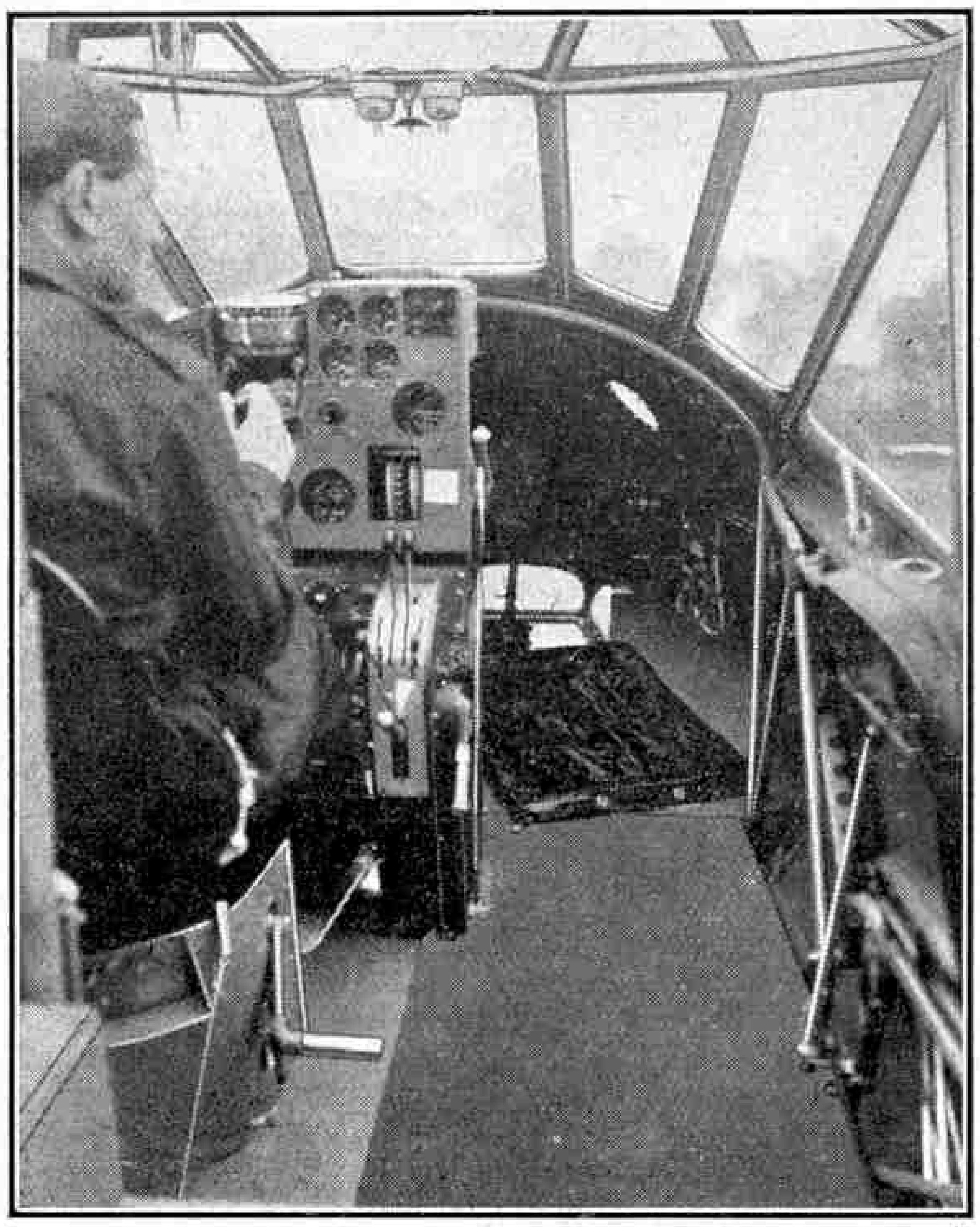
Electric lamps with rheostat controls enable all members of the crew to carry out their duties efficiently during night operations. The aeroplane has navigation and identification lights, and a landing searchlight is mounted in the nose of the fuselage.

Aircraft, like ships, have to be prepared for emergencies. In the "Anson" special stowage is provided for detachable parachutes, and in the nacelle of the starboard engine for the stowage of an automatically inflatable dinghy, which can also be released by means of a rip cord. In the tail fin space is provided for the storage of distress signals. A first-aid outfit is mounted in the rear gun turret, with access from outside the aircraft when on the ground. There are three large emergency exits in the roof of the cabin.



A front view of the Avro "Anson" on the ground. The engines are 620 h.p. Armstrong Siddeley "Cheetah IXs." For the illustrations on this page we are indebted to the courtesy of A. V. Roe and Co. Ltd., Manchester.

In designing the "Anson" special attention was paid to producing an aeroplane that would be easy to maintain and repair. For many years past all Avro aircraft have had welded steel fuselages, and all Avro monoplanes have had cantilever wooden wings; and the efficiency of this form of construction has been proved in service in every climate of the world.



A view of the pilot in his cockpit, showing the throttle and fuel mixture controls and the instruments, which at night are flood-lit.

The use of bakelite plywood has still further increased the durability of the Avro stressed skin wooden wing. This type of plywood is exceptionally strong and is absolutely impervious to water, and a bakelite plywood covered wing never needs complete overhaul.

The wooden wing of the "Anson" is covered with plywood, with the exception of the ailerons and flaps. As a protection against the weather the whole of the upper surface of the wing is also covered with nainsook, and on the lower surface the joints in the plywood covering are sealed with linen tape. The wing is then doped with a special finish.

The tail unit includes a welded tubular steel rudder and elevators, all with doped linen covering. Small hinged flaps fitted to the trailing edges of the elevators and adjustable by a control in the pilot's cockpit are used to trim the aeroplane at different loads and varying speeds, and a similar flap on the rudder is used for directional trim. The tail-plane is entirely of wood, and the fin is an integral part of the fuselage.

A welded tubular steel fuselage has many advantages, the chief being that it is cheap and simple to build, it can be repaired easily, and there are no joints into which damp can penetrate. Another important point in its favour is that in the event of a crash the structure has a much higher shock-absorbing capacity than a wooden one. The nose of the fuselage of the "Anson" is built up on a light metal frame and is panelled with Alclad sheeting; but the remainder of the fuselage frame is of welded steel tube, with wooden fairings to give it a good streamline shape, and is covered with fabric.

There are windows along the entire length of both sides of the cabin, and much of the roof is also transparent. The pilot has a particularly good view forward and to either side, and in bad weather a clear view for flying and landing is given by means of sliding panels. Adequate ventilation is provided, and in cold weather the cabin can be heated by air drawn from a muff on the engine exhaust system, and controlled by levers operated by the crew.

The undercarriage is drawn up into recesses in the underside of the engine nacelles when the aeroplane is in flight, and when fully retracted about one-third of each wheel protrudes below the nacelle. If necessary a landing can be effected with the undercarriage in this position without serious damage to the aeroplane. The retracting gear is operated by a crank handle that projects from beneath the pilot's seat and can be manipulated either by the pilot or by another member of the crew. The undercarriage is positively locked into position for landing, and the pilot operates the release control with his left hand. In addition to the usual warning devices, the wheels of the undercarriage are visible to the pilot at all times. The pneumatic wheel brakes can be applied safely immediately the aeroplane touches the ground, and for manœuvring on the ground each wheel brake is separately operated by the normal movement of the rudder bars.

The "Anson" is fitted with two Armstrong Siddeley "Cheetah IX" engines that develop a total of 620 h.p. at 6,000 ft., at which height the cruising speed of the aeroplane is 158 m.p.h. The maximum speed it can attain is 188 m.p.h., at a height of 7,000 ft.; and the absolute ceiling is 20,700 ft. There are two fuel tanks to each engine.

The main dimensions of the "Anson" are span 56 ft. 6 in., length 42 ft. 3 in., and height 13 ft. 1 in.

Making Post Office Telephones

How the Hand-Microphone Type is Produced

By T. R. Robinson

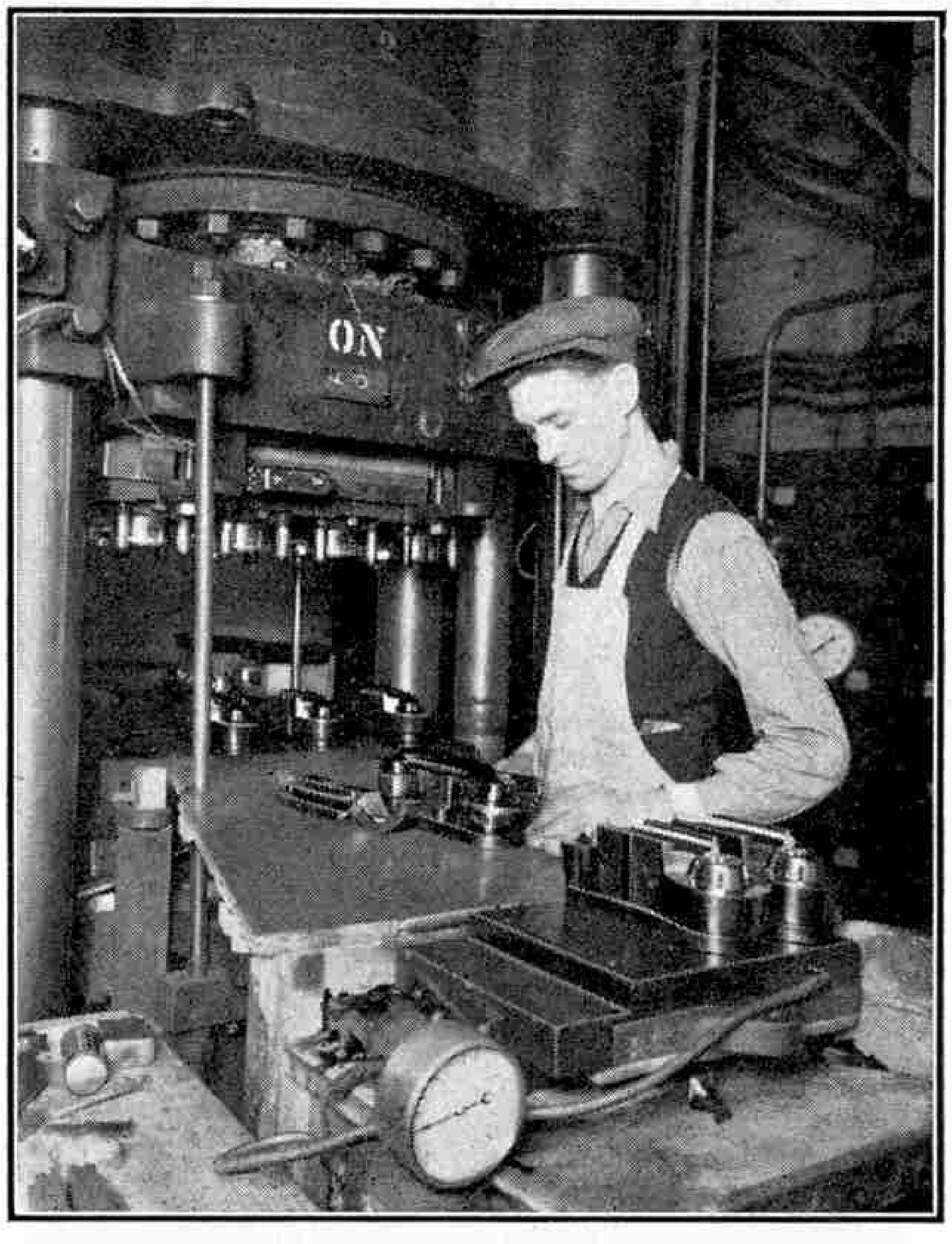
THE Post Office hand-micro-telephone is an unusually interesting instrument, not only on account of its high efficiency, but also because it is a remarkable example of moulded products of the modern kind. Without the great developments that have taken place in plastic moulding during recent years it would have been almost impossible to manufacture this now familiar instrument.

Telephones of the hand-microphone type are made for the Post Office by a number of firms, all of whom work under a strict specification that ensures that all parts, no matter from which factory they come, are interchangeable. One of the firms producing the instruments is the Telephone Manufacturing Co. Ltd., at whose Dulwich works the photographs illustrating this article were taken.

As mouldings form such an important part of the telephone, the shop devoted to their production is an important one. Large hydraulic presses, equipped with electrically-heated moulds, turn out the various parts so accurately that only a few additional processes are necessary before they are assembled into place in the complete instruments. A very ingenious method is used in the making of the hand-set bar, which is the part of the telephone that has the microphone and receiver at its opposite ends. The mould for this part is made up of eight pieces, the top half of the mould being fitted to the moving part of the press, while the bottom portion is duplicated, so that a mould can be prepared while the other is under pressure.

The two insulated connecting wires, which run through the bar and form the connections to the receiver, the microphone connection-link, and the locking-ring that secures the mouthpiece, are all moulded-in, and form a permanent part of the component. These parts are placed in position in the mould before it is inserted in the press, and the moulding is formed round them.

The ring, which is a metal pressing, is put in first, followed by the connecting-link. A small locating pin, screwed into the hole in the link that later will receive the microphone spring-screw, has its projecting part inserted in a hole in the mould, and is thus retained in the correct position. Next, the two wires, which already have had the metal terminal lugs attached to them, are bent to shape and fitted, temporary locating pins screwed into the lugs again serving to secure them in the correct places in the mould.



Moulding hand-sets in a 350-ton press, in which four are made at once. The illustrations to this article are reproduced by courtesy of the Telephone Manufacturing Co. Ltd., London.

All is then in readiness for the moulding powder; and for forming the middle, or hand-grip part of the bar, small compressed blocks of the powder known as "pre-formed tablets" are used. These enable the plastic material to be put in exactly the required place in the mould and in this instance a row is placed under the two wires and then more specially-shaped tablets are placed on top. After the tablets are put in position the mould is inserted in the press, and a measured quantity of moulding powder is poured in at the ends of the mould to form the material for the microphone and receiver sockets.

The closing of the press and the electrical heating of moulding follows, and the heat and pressure cause the powder and tablets to flux into one homogeneous whole and form the component. This part of the process is called the "cure," and for such parts as the telephone hand-set bar the time taken to complete the formation of the moulding is about seven minutes.

More than one moulding is made at each stroke of the press, some large presses making as many as four at a time. Pressures up to 350 tons are exerted by the presses, and the temperatures vary between 300 and 340 degrees Fahrenheit. The moulds are chromium-plated, and very highly polished to give a good surface to the mouldings and so reduce the amount of subsequent polishing required.

When the cure is completed the press is opened, and the moulds are removed and separated to permit the bars to be taken out. A small rotary gripping tool is then attached to each of the temporary locating pins in turn, and these are unscrewed from their lugs, which are now firmly secured in their places in the mouldings.

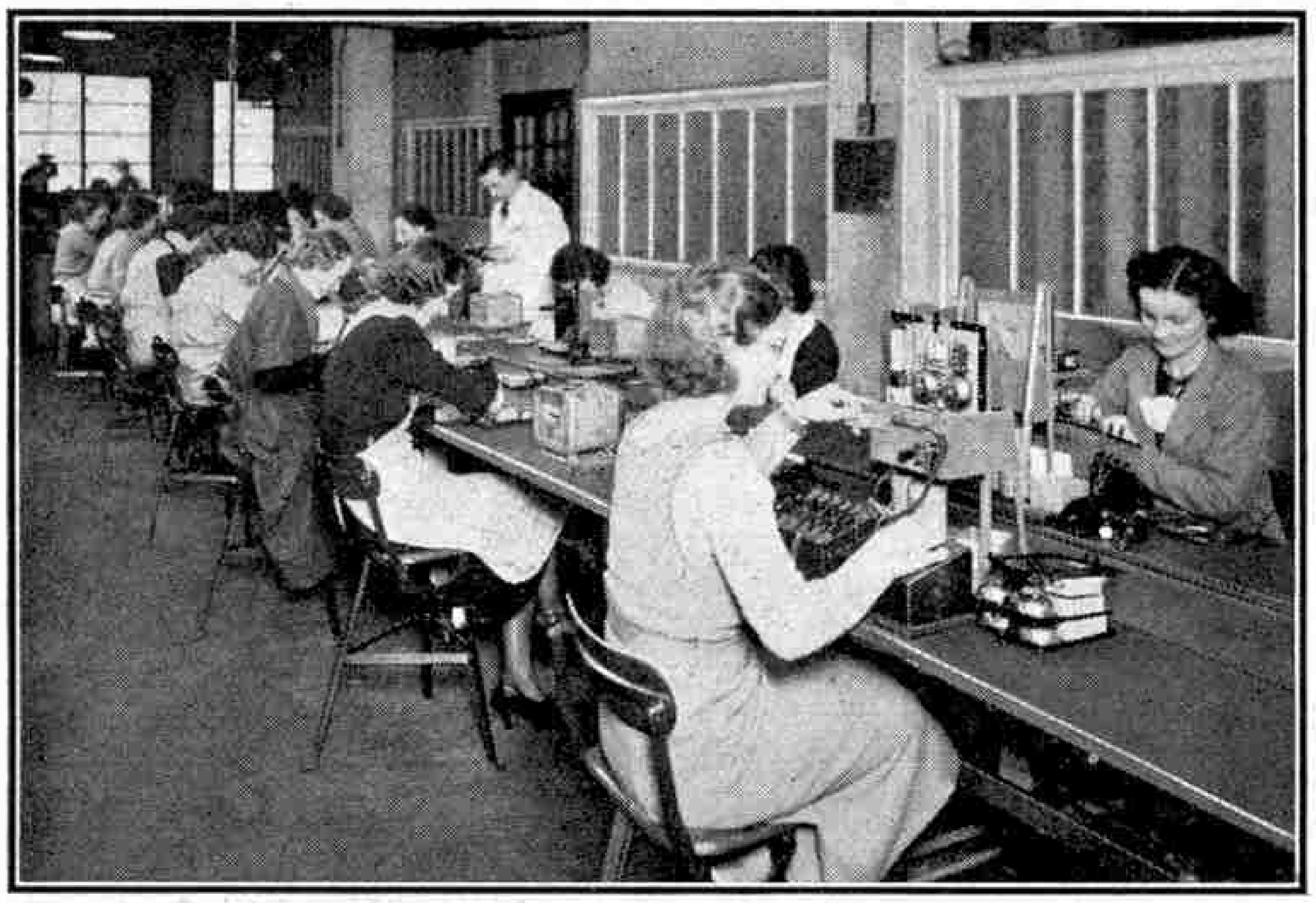
Ear-caps and mouthpieces are somewhat similarly moulded on smaller presses, six at a time. Each has its own special difficulties of production. The mouthpieces have three undercut grooves around the inner edge of their flanges for the reception of the tongues of the locking ring of the arm, and the receiver caps are threaded, and so must be screwed off their moulds after completion. To permit the mouthpiece grooves to be formed, three detachable parts are made in each mould; and these are fitted in such a way as to be firmly in place during the moulding operation, but so as to release the mouthpiece when required. Pre-formed tablets of moulding powder are again used to ensure the correct placing of the material. The pedestal, base and the internal terminal block are all made similarly in moulding presses, the same method of placing the moulded-in metal parts in the mould being adopted for each.

The cradle, on which the hand-set portion of the telephone rests when not in use, and the contact-bar, which is held down by the weight of the telephone when it is on the cradle, are not moulded by the same process as the other parts, a different type of plastic material being used for them. This is moulded by what is known as the "pressure injection method," the component being formed by forcing the material into the empty mould under a pressure of 30 tons.

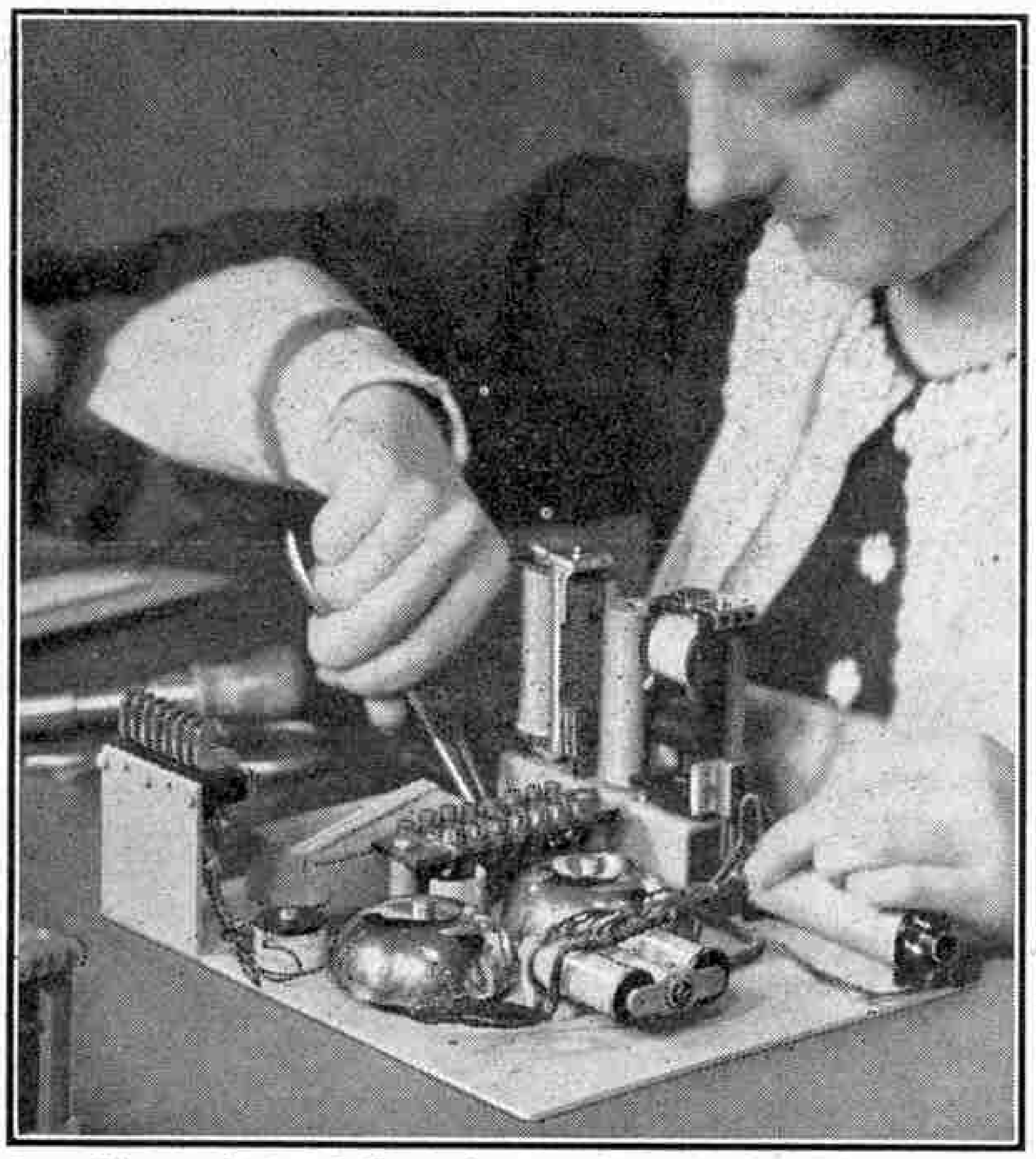
After moulding the parts are trimmed up, and small ridges and other moulding marks are removed by scraping and filing. Next follows the polishing, which is carried out in a large shop equipped with motor-driven polishing heads running at high speed. There are several stages of polishing and these not only give the parts a high gloss, but also remove burrs and edges and round-off small inequalities. Other small operations, such as the drilling of the hole in the rear of the pedestal for the connecting cord, and the piercing of the holes in the mouthpiece or receiver cap, are also carried out at this point, multiple-spindle drills being used for the latter operation.

In the meantime, in another part of the works, automatic lathes have been producing the screws, bushes and other metal parts of this type required, while presses have turned out the contact springs and other flat portions necessary, and the next stages bring the moulded and metal parts together. First the assembly of contact springs that is operated by the contact-bar is built up, and when completed is attached to the internal terminal block by a screw. Then the various terminal screws and soldering tags for the connecting wires are fitted, followed by the wires themselves. These are of bare tinned copper, and are insulated by the threading on of lengths of sleeving, various colours being used to distinguish some circuits.

The block is next placed in position in the pedestal and secured by the same two screws that hold the cradle to the pedestal top, the screws passing through clearance holes in the pedestal and threading home in bushes moulded into the terminal block. The next parts to be fitted are the contact bar and its spring. The bar is moulded-in with its metal plunger, the latter moving in a central hole in the terminal block. A light coil spring is fitted to raise the bar when the telephone hand-set is lifted off the cradle, and when this occurs an insulated tip fitted to the plunger allows the contact springs on the block to close their circuits. The insulated tip on the plunger is neatly forced into position before the part is fitted to the block, a clever jig-tool that provides just the right amount of force for the job being employed.


The conveyor on which bell-sets are assembled, stage by stage. Soldering work is being carried out in the centre, and the sets are being tested on the right.

When the contact bar and its spring are in place, a small split-pin locks them, and further assembly can be carried out. The small five-way cord that connects the block to the dial is added while the pedestal is resting upside down in a jig; and next comes the induction coil used in the microphone and receiver circuits. The various connecting wires for this are then passed through their soldering tags, and a girl with a tiny iron and a stick of solder rapidly solders them in place. The speed with which these joints are made is quite remarkable, especially when it is realised that each joint is surrounded by wires and parts that must not be damaged by the hot iron.


Assembling a telephone bell-set of the type installed in public kiosks. Note the neat "tied-in" wiring.

The flexible telephone cords connecting the pedestal to its bell-set and hand-microphone are the next components to be fitted. The wire ends of these are coloured to avoid mis-connection, and each wire is placed on its terminal screw and secured by nuts.

While this work has been proceeding, the hand-set parts have been receiving attention in another part of the works. The die-cast receiver case is drilled to receive its attachment and magnet screws, and an external thread is cut on its outside to receive the ear-cap. All this work, like all the other processes of telephone manufacture, is done to accurate jig-controlled measurements to ensure interchangeability.

The receiver magnet pole-pieces each carry a bobbin wound with fine gauge wire, and these pole-pieces are matched in pairs, and their connecting wires soldered together to couple the inner ends of each winding. Special cobalt steel permanent magnets are fitted to the receiver cases, and the pole-pieces are mounted over them and secured by screws, after which the other ends of the bobbin windings are soldered to the connecting tags of the receiver. The same screws that secure the receiver to the hand-set bar also form the terminals, and this saves unnecessary parts.

The air gap between the pole-pieces and the receiver diaphragm is next set. This is a very critical operation, and to get the right gap special grinding jigs are used, the receiver case being slid along a groove while the grinding-wheels remove the surplus metal from the tips of the pole pieces. After this a powerful blast of air blows away any metal particles that may be sticking to the magnets or other metal parts, and the whole of the inside of the case is sprayed with cellulose lacquer to protect it. A strong magnetic field is then applied to give full magnetisation of the receiver, and when the diaphragm is fitted the receiver is complete.

The microphone is formed by a complete self-contained inset, but this is made at another factory, and supplied complete and ready for fitting. The springs and connections to which it is fitted in the hand-set are screwed in position, and the microphone then drops neatly into place, being retained by the mouthpiece.

The opposite end of the connecting cord uniting the hand set and the pedestal is attached to the hand-set terminals; the microphone, receiver diaphragm and ear-cap are each in turn put in place; and the fitting of the pedestal base, which in the meantime has received its feet and attaching screws, completes the instrument. The dial, like the microphone, is made at another works, and merely fitted to the pedestal and connected up.

The whole of the work at the Telephone Manufacturing Company's works is on "flow-production" lines, and the assembly of telephones is carried out on the conveyor system, a central steel band serving to carry the telephone instruments from one operative to another down long benches at which girls sit on either side.

When completed the instruments are tested by a clever device that may be called a "mechanical voice," for it is arranged to reproduce the whole band of sound frequencies likely to be encountered by the telephone when in use. The output of current of the microphone is checked by accurate and very delicate meters during the test, and any inefficiency or distortion is revealed at once. Very few defects are discovered in the telephones tested, however, for the components are so thoroughly tested at all stages of manufacture that it is practically impossible for errors to pass as far as the assembly stage before being detected.

The complete instruments then pass to a further inspection, this time by Post Office inspectors, who check over every part and test the performance of the instruments in a very exacting manner before marking them with the "approved" stamp that authorises their use.

The bell-sets, which accompany the telephones, are made on another conveyor belt, the metal parts, mouldings and other similar components being produced by presses and automatic lathes in the same way as the telephone parts. Many of the parts for both telephones and bell-sets are plated, and for these a large plating shop is used, the parts being dealt with as they move along through the baths, and emerging with the right thickness of deposited metal at the end of their travel.

The condensers used in the bell-sets are made up of paper and tinfoil, interleaved and impregnated with wax; and the interleaving is carried out by girl operators on cleverly constructed machines that feed paper and foil on to a former that shapes them. After this the assembled condenser is waxed under pressure at a controlled temperature, and then mounted in a protective metal case.

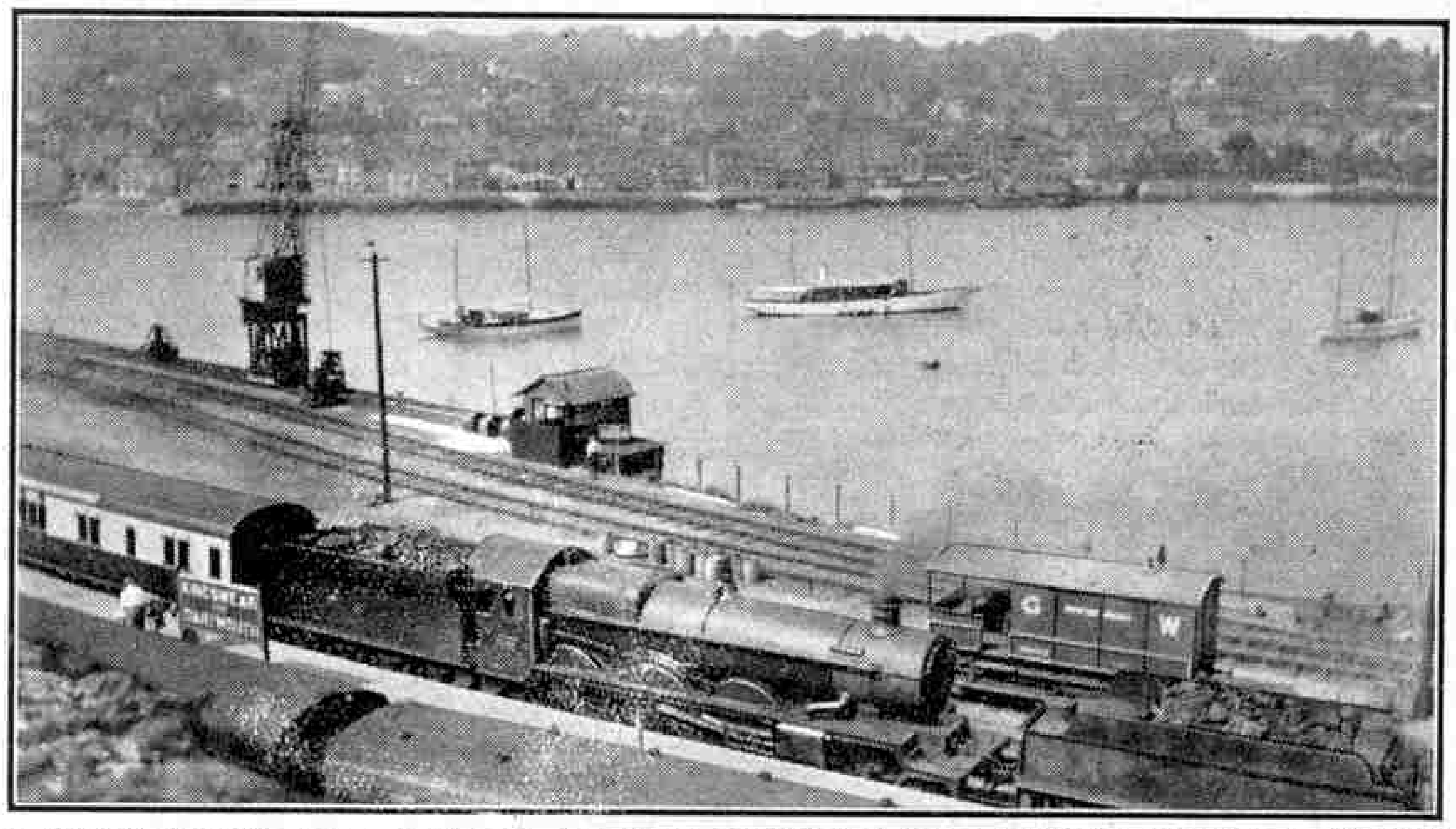
The metal bell-set base is dealt with first on the assembly benches, the bells and their magnets and other similar parts being added as the bell-set passes down the line. When the various parts are all in place, the connecting wires, already assembled into a component and tied with thread to retain them in place, have their ends passed through the terminal lugs of the parts, and are swiftly and deftly soldered by a girl. As with the telephones, elaborate testing follows the completion, and then, after the cover is fitted, the bell-set is ready for its telephone.

Some "Midland" Observations

Mr. J. M. Craig sends the following notes on observations made at Cricklewood of locomotive and train working on the Midland Division main line of the L.M.S.

Comparison of the numbers of engines of different classes observed reveals two interesting "appearance contests." "Jubilees" and "Patriots" against Compounds represent a "battle" between red-painted classes, and among the black-painted engines, the 5P5F 4–6–0s are in similar rivalry with the 2P 4–4–0s.

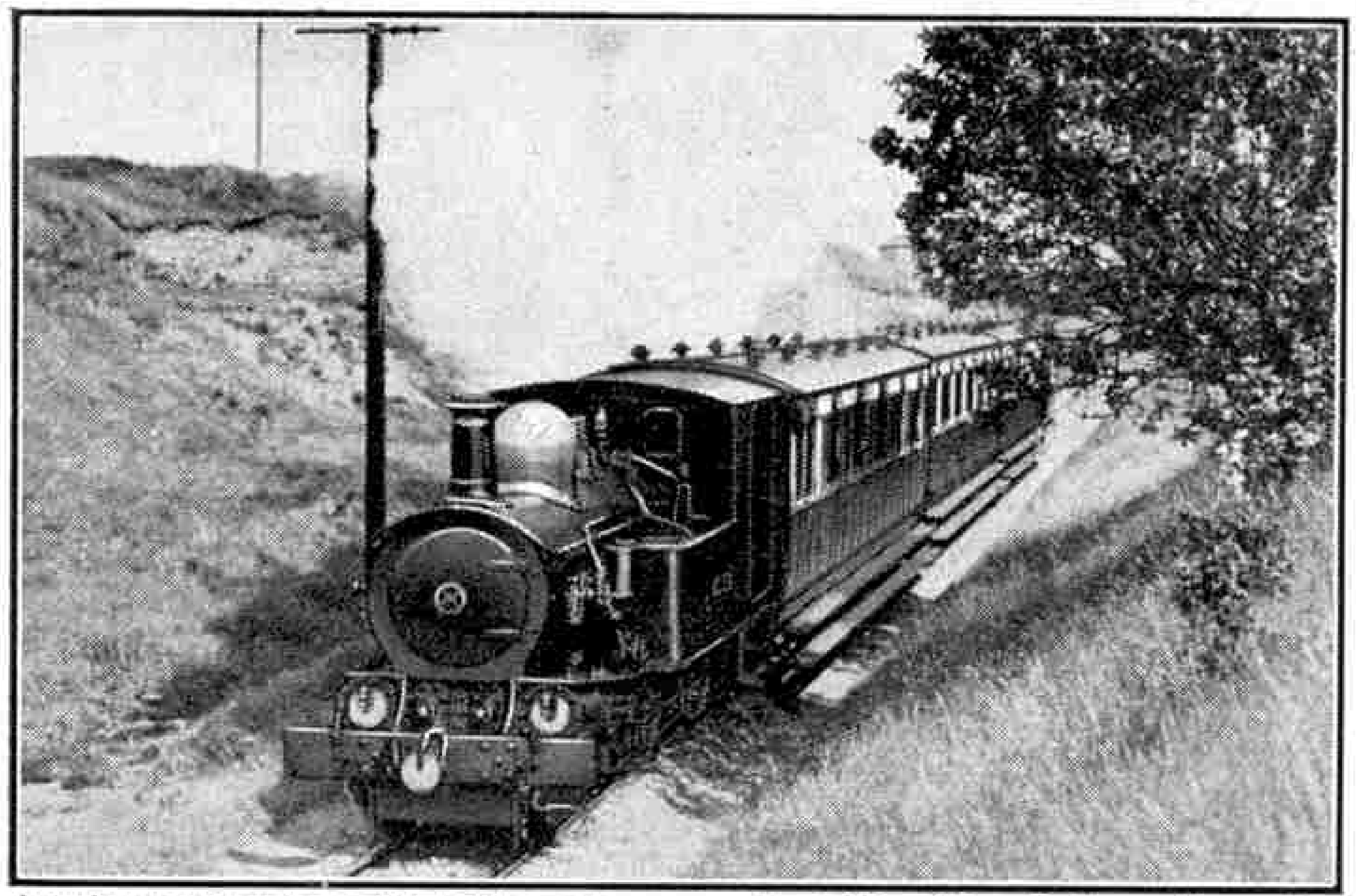
In the first of these "contests" the "Jubilees" at one period had a strong position with a total of 70, but by the time of writing the Compounds had put on a spurt and reached a total of 73, chiefly as the result of the appearance of Nos. 1069, 1175, and 1187 in ordinary working, and No. 1188 on a day of special traffic.


A scene at Kingswear, the station for Dartmouth, G.W.R. There is a double-headed express alongside the platform, the train engine being a 4-6-0 "Castle." Photograph by A. C. M. Clements, Tunbridge Wells.

One week "*The Palatine*" Manchester express enjoyed the services of Compounds Nos. 1026, 1029 and 1061 on consecutive days. Several engines of this class have appeared but once during the period under consideration, including No. 1015 on a Sunday excursion to Derby, No. 1044 on a 99-min. train from Leicester, Nos. 1072 and 1076 together on a train from Sheffield and No. 1083 outward bound. The 2.10 p.m. to Nottingham, one of the 60 m.p.h. trains, recently had Compounds 1019 and 1094 respectively on successive days.

The Class 2 4–4–0s observed to the date of writing numbered 46 against a total of 45 of Class 5P5F. Piloting is still practised occasionally and has resulted in some interesting "old time" 4–4–0 combinations, such as Nos. 569 and 568 on the up "*Thames-Clyde Express.*" A Bradford express had Nos. 409 and 499 one afternoon, and "*The Palatine,*" made up to 12 coaches, had Nos. 513 and 424. No. 419 has appeared twice on "crack" trains, once with No. 551 on the up "*Yorkshireman*" and again on the 3.32 p.m. arrival, booked up to St. Pancras in 70 minutes from Kettering, with No. 468 as pilot. Special traffic on Saturdays however resulted in a spurt on the part of the 5P5F class and Nos. 5125, 5204/11/24, 5338 and 5421 went down in the records.

Among other interesting examples of piloting, the colossal engine power, according to Midland Division standards, of two "Jubilees" has been observed. Rather unusual too once was the mating of No. 5602 with No. 1023, a rare occasion for the bigger engine to be in front.


A train from Douglas to Port Erin on the narrow-gauge Isle of Man Railway. The engine is a 2-4-0 tank, No. 16 "Mannin." Photograph by A. R. Prince, Manchester.

Class 3 4–4–0s are comparatively rare now and have totalled only 13 all told, but among recent interesting happenings was the arrival on successive excursion trains of Nos. 755 and 756 of this little-seen class.

Sussex Coast Electrification

The basic feature of the through services on the Sussex electrified lines that link London, Littlehampton, Bognor Regis, is an hourly service of fast trains from London to Horsham, Pulborough, Arundel, Littlehampton, Bognor Regis, Chichester and Portsmouth. Those to Littlehampton are routed via the main line as far as Preston Park; the other hourly service caters for all the places previously mentioned, and runs from Victoria via Horsham and down the Mid-Sussex line.

Through steam services from Brighton to Bournemouth, Plymouth and Cardiff still use the coast line and add further complication to an already busy system, although they have been accelerated slightly to correspond with the new and faster schedules of the electric trains.

Altogether 292 vehicles have been provided for the operation of the new electrified lines including 13 four-car vestibuled sets each with a buffet car. The buffet cars are of new design as far as the Southern Railway is concerned. The saloon section provides seating accommodation for 16 passengers and the fitting of specially shaped tables allows ample room for passengers and a greater circulating area.

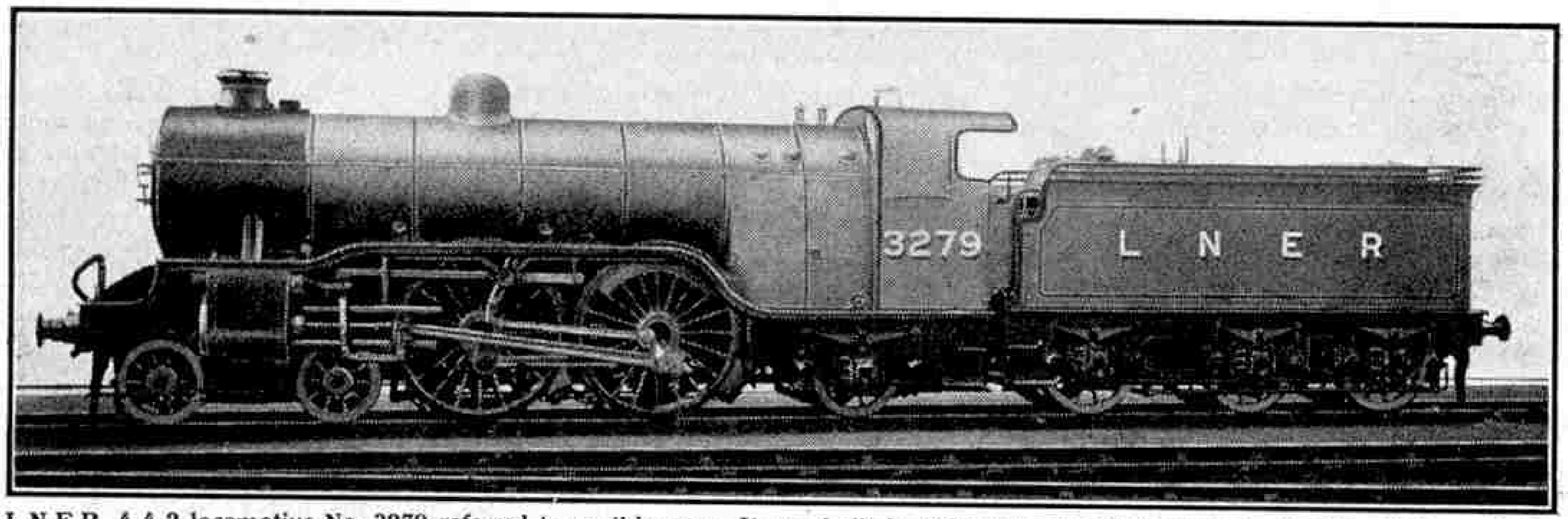
York Railway Museum

An interesting addition has been made to the York Railway Museum by the presentation by the Duke of Rutland of a wagon and a short section of track at one time used for the conveyance of coal from Muston Gorse Wharf, on the Grantham Canal, to Belvoir Castle, between Nottingham and Grantham. The railway to the Castle was about two miles long and was completed in 1815 by the Butterley Iron Works. Certain stretches have been preserved within the grounds of Belvoir Castle, and some of the edge rails, in the form of switches and crossings, are already at South Kensington, the Duke of Rutland having presented them to the Science Museum in 1892. The track has a gauge of 4 ft. 4½ in. and the rails are 3 ft. long.

Remarkable Record of L.N.E.R. "Atlantic"

It is not often now that one hears of a 30-year old locomotive being modernised and given a new lease of life. This is the case however with one of the L.N.E.R. large-boilered Ivatt "Atlantics," No. 3279, which was originally built by the G.N.R. as a two-cylinder engine in 1904. In 1915 it was converted into a four-cylinder engine and ran in this form until last year, covering some 629,300 miles during that time.

During the engine's latest overhaul it has reverted to the two-cylinder arrangement. The cylinders now fitted are of the same pattern as those supplied to the K2 "Moguls." They are fitted with 10-in. diameter piston valves operated by Walschaerts valve gear. The valve travel at 70 per cent. cut-off is 6 in.

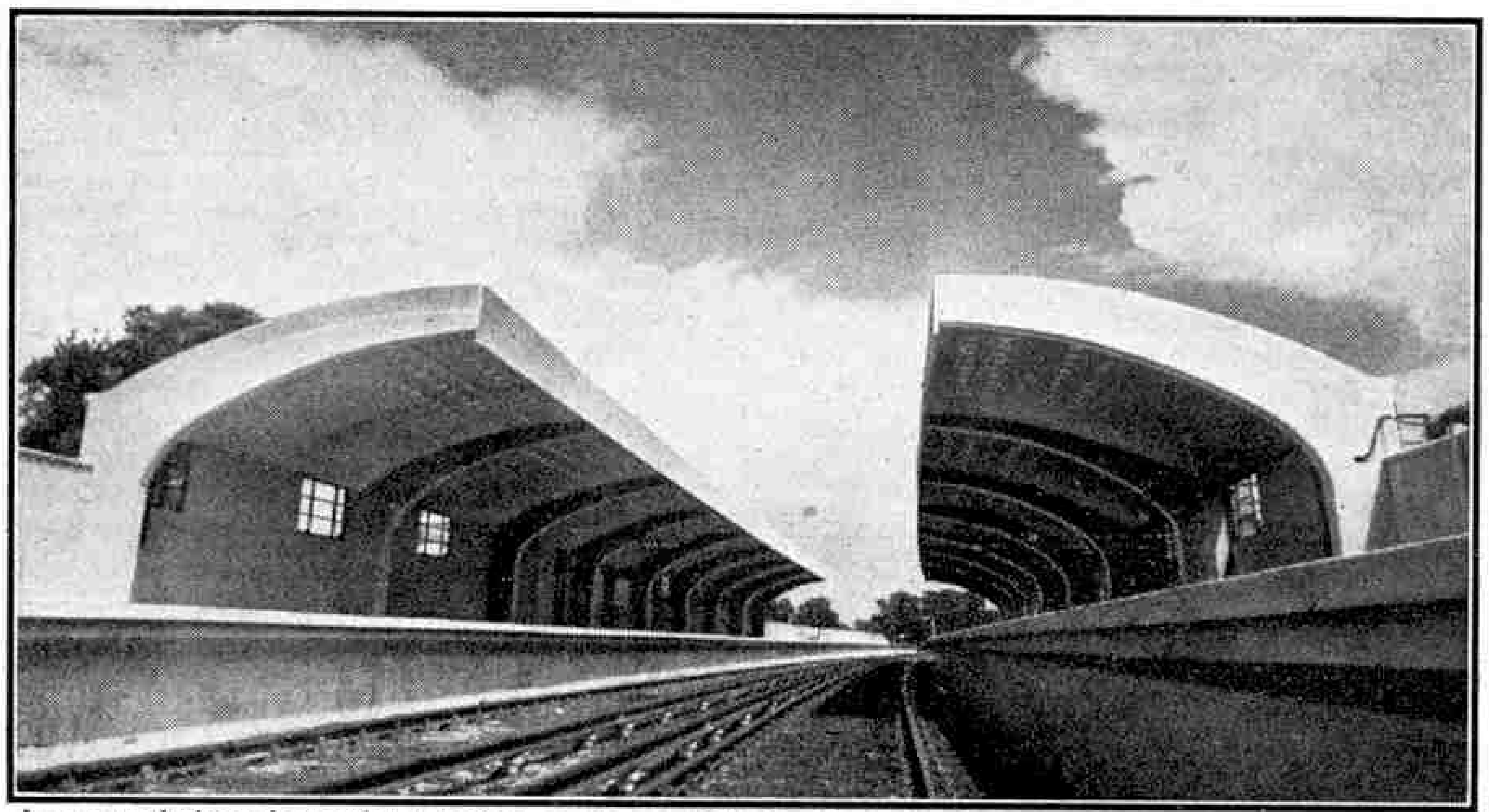

L.N.E.R. 4-4-2 locomotive No. 3279 referred to on this page. It was built in 1904 with two cylinders and rebuilt in 1915 as a four-cylinder engine, but now has two cylinders. Photograph by courtesy of the L.N.E.R.

In its new form, as shown in the upper illustration on this page, the engine weighs 70 tons 14 cwt., 40 tons being available for adhesion. The driving wheels have a diameter of 6 ft. 8 in. and the fire-grate area is 31 sq. ft. The working pressure is 170 lb. per sq. in., and the tractive power is 18,785 lb. A 3,500 gall., 6½-ton tender is fitted.

Narrow Gauge Locomotives for Rhodesia

Beyer-Peacock and Co. Ltd. have recently completed an order for 12 Beyer-Garratt 2–8–2+2–8–2 locomotives for the Rhodesia Railways. This series of engines is a repeat order, for in 1925 Beyer-Peacock and Co. Ltd. delivered 12 engines for service on the 143-mile Villa-Machado-Umtali section of the Beira-Bulawayo main line, and in 1929 eight more engines of the 2–8–2 2–8–2 wheel arrangement were built by the same firm for service on the Bulawayo-Victoria Falls and Salisbury-Umtali sections.

In the most recent batch several details have been improved. The last engine of the series is fitted with a speed indicator, and automatic flange lubricators of the Hasler type are fitted to the bogie wheels of the last two engines.


An unusual view of one of the stations on the new S.R. line from Chessington to Motspur Park. This shows the novel design of the reinforced concrete awning. Photograph by courtesy of the S.R.

The latest 2–8–2+2–8–2s, which bring the total in operation on the Rhodesia Railways up to 48, have four cylinders each 18½ in. by 24 in. The diameter of the driving wheels is 4 ft. The boiler pressure is 180 lb. per sq. in. and the total weight of each engine in working order is just over 150 tons. The tractive effort is 52,360 lb. The maximum permitted speed of the engines is 40 m.p.h. between Salisbury and Umtali.

Bank Holiday Traffic

Special arrangements were made by the four main line railways to deal with the additional Bank Holiday traffic last month. Special timetables temporarily replaced the full summer timetables, and during the week-end 19,600 steam locomotives, 2,000 electric motor vehicles and 43,000 carriages were operated with 10,200 signal boxes controlling all traffic movements.

The G.W.R. ran 500 additional trains on the Friday and Saturday, and 60 special trains were run for Navy Week at Plymouth and Portsmouth and the Tidworth Tattoo.

The L.M.S. operated 1,000 special and relief trains, and 200 express trains left Euston and St. Pancras for Scotland, the north of England and the Midlands on the Friday and Saturday preceding the holiday. Excursions handled at Blackpool numbered 300.

Nearly 1,500 additional trains were run by the L.N.E.R. Altogether 3,800 passenger engines and 13,500 passenger coaches were in service. The streamlined high-speed trains *"Coronation," "The Silver Jubilee"* and *"West Riding Limited"* were suspended on the Friday and Monday in order to make room for the additional holiday traffic.

On the Friday and Saturday the S.R. ran 240 extra long-distance expresses, including 82 additional Continental Boat Expresses. Excursions ran from London to Chatham and Portsmouth, and from provincial centres to these ports and to Plymouth in connection with Navy Week. On 1st August several special trains were run to Southampton, where the Cunard White Star liner *"Queen Mary"* was on view.

L.M.S. Locomotive News

Class 7 4–6–2 engines now work to London Road Station, Manchester, the arrangement being that when there is a spare engine of this type available, it may work the 10.30 a.m. from Euston, returning with the 5.45 p.m. *"Comet."*

"Royal Scot" 4–6–0s Nos. 6111 and 6131, are now the only engines of this class left at Longsight, Nos. 6148, 6165 and 6167 having recently been transferred to Camden.

A start has been made with the withdrawal of the former L. and Y. "Baltic" tank engines. No. 11115 was the first to go in June and this was followed by No. 11112 in July.

Class 5XP 4–6–0 engine No. 5572, formerly *"Irish Free State"* has been renamed *"Eire."*

Commencing with the summer services, the St. Pancras–Manchester expresses have been worked throughout by "Jubilee" class 5XP locomotives, this being made possible by the completion of bridge reconstructions at Chapel-en-le-Frith. Hitherto the engines used on these expresses have been changed at Derby, north of which the class 5 mixed traffic 4–6–0s were mainly employed. The "Jubilees" are allowed to take 275 tons unassisted north of Derby; this is 20 tons more than the class 5 mixed traffic 4–6–0s.

The latest series of 4–6–2s are now in traffic. This includes the streamlined engines Nos. 6225-6229 and the non-streamlined engines Nos. 6230-6234. These engines are the "Duchesses," described and illustrated on pages 434-5 of last month's *"M.M."* Class 4 2–6–4 tank engines Nos. 2618-2621 have been completed at Derby.

We are indebted to Mr. D. S. Barrie for the foregoing information.

G.N.R. (I) Locomotive Reconstructions

The G.N.R. (I) have instituted a rebuilding scheme for the eight 4–4–0 locomotives of classes "S" and "S2," which performed the bulk of the hardest main line work from 1913 until the introduction of the five 4–4–0 compounds in 1932. In order to bring them more into line with current requirements new frames and boilers are being provided. The external lines of the rebuilt engines are practically the same as before, but the smart blue livery that replaces the black paint previously used, shows off to perfection the characteristic neatness of the design.

The engines are Nos. 170-4 and 190-2, and will be named *"Errigal," "Slieve Gullion," "Slieve Donard," "Galteemore," "Carrantuohill," "Lugnaquilla," "Croagh Patrick"* and *"Slievenamon"* respectively.

FOOTBALL! HOW TO IMPROVE YOUR GAME

By Eph. Longworth (Ex-English International; Trainer-Coach, Liverpool A.F.C.)

NOW that September is here boys in every part of Britain are itching to kick a football once again. Even I, after spending over 30 years in the game, playing as a professional and coaching young players, develop a restless urge to get out on to the field and punt a big ball about. But there is a lot more in football than booting the ball. It is physical fitness, an understanding of tactics and quick thinking that mark the good footballer, not mere weight and bustle.

The average schoolboy gives very little thought to his physical fitness. Probably he attends his school gymnasium once or twice a week, and out of school hours he probably runs far more than he walks. And when his football coach requires him to undergo regular training exercise he almost certainly regards it as a nuisance. "Let's get on to the field and play with the ball," he says.

Nevertheless, regular "physical jerks" are a very important part of a footballer's training. They help to build up muscle and stamina so that the player can last the whole length of a hard fought game. They help to co-ordinate the eye with the brain and then the muscles so that movements may be thought out and carried out in a flash. Football is a team game and every member of the side owes it to every other member to keep fit.

The boy who has left his school and spends the greater part of the day cooped up in an office will find this matter of physical jerks even more important. Muscles soon become slack if one spends hours each day bending over a drawing board or an office desk, but here are a few simple "first-thing-in-the-morning" exercises that will put things right if they are carried out each morning.

First of all, spend five minutes deep breathing at an open window. Remember to inhale and exhale slowly. This exercise improves the wind.

Next, the "touch-toe" exercise. Stretch the arms as far as they will go above the head, straighten the knees and carry the arms slowly forward and down to the toes. After a dozen bends, walk to and fro along the bedroom floor on the hands and feet, with the knees still kept straight. Don't overdo this exercise; stop before it becomes a strain.

Next, get down on your back on the floor with hands in the hips firm position. Raise both legs to the perpendicular. Try to imagine yourself riding a bicycle upside down and spend two minutes pedalling vigorously.

Let the legs go back to the rest position, both stretched on the floor. Raise the right leg slowly upward, past the perpendicular and downward as far as it will go toward the head. Then reverse the action, taking the right leg back toward the floor. Repeat with the left leg so that left and right pass one another at the perpendicular in a scissors motion.

This splendid photograph shows Bastin, the Arsenal and England forward, threading his way through the defence in a league match against Portsmouth.

Ten minutes of these exercises every morning will work wonders and make the budding footballer far more nearly fit than casual periods of more lengthy exercising.

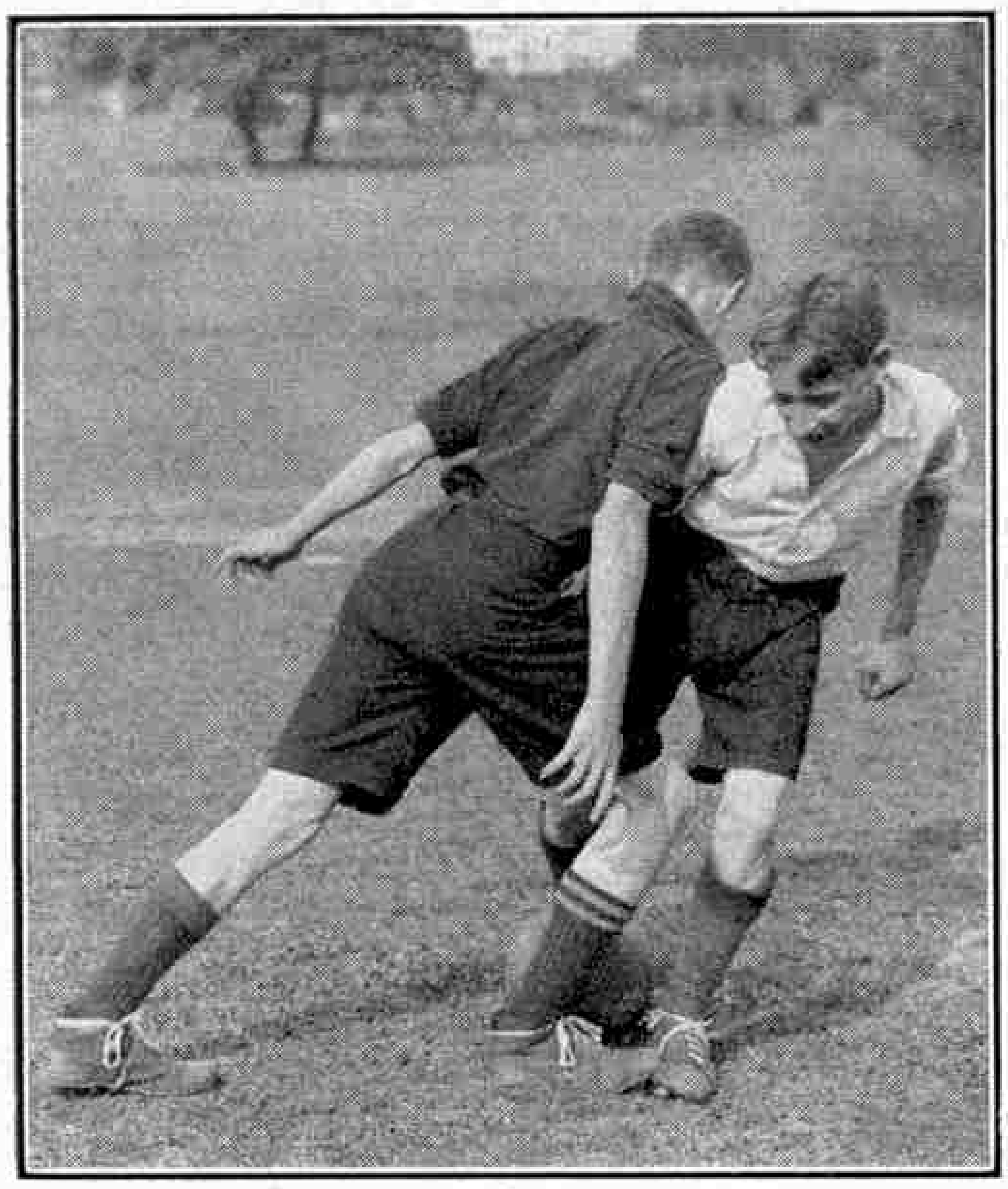
Perhaps you are still doubtful whether these exercises are really necessary. If so, just take a look at this list of things a player must be able to do before he can aspire to join a good team: 1, run with speed and determination; 2, turn quickly and to swerve; 3, kick well and cleanly with either foot a ball coming from any angle; 4, control a ball by means of trapping, dribbling, or passing; 5, tackle well; 6, head a ball with judgment; 7, combine with other players.

A fair charge, although the arm has swung away from the body. This illustration and the upper one on the opposite page are reproduced from "Association Football," by courtesy of Evans Bros. Ltd., London.

Physical fitness brings with it the ability to master the first two requirements, but the remainder can be acquired only by constant practice on the field with a ball and other players. Before we go out on to the field to discuss these points, however, I would like to give a special word of encouragement to my younger readers, many of whom, no doubt, are frequently called on to play against older, bigger and stronger boys. The little fellow who can tackle correctly and control the ball need have no fear of the big chaps. One of the greatest centre half-backs who ever played for England, Wedlock, was so small that more often than not the opposing centre-forward towered head and shoulders above him. Nevertheless, so great was Wedlock's skill that he usually managed to "bottle up" the big fellows.

Every boy who hopes to play football must learn how to kick a ball correctly, and so we will make this the starting point of our ball practice. Always remember that a short low kick, accurately placed to one of your own team, is much more valuable than a wild slash that sends the ball into the possession of an opponent.

Get as close to the ball as possible for the low kick, with the non-kicking foot right alongside the ball. The knee of the kicking leg must be bent over the ball and the toe drawn back so that the ball is hit with the top of the instep. As the kick is made, the knee straightens out so that the foot, with the toe still well back, follows through in the direction of the ball. Keep the eye on the ball in this as in every other movement of the game. Often a full back must make a high kick to clear oncoming opponents, and in this the non-kicking foot must be kept farther back from the ball, and the body, instead of bending forward over the ball, should be upright or even leaning back. When kicking the ball at a wide angle, as, for example, when a wing forward centres into the goal mouth, the non-kicking foot is kept well back and wide of the ball. The kicking foot is swung round in a circular sweeping



movement and the body pivoted on the non-kicking foot.

The pivoted kick appears also in corner kicking, but in this case the ball is given a slight upward flick with the toe so that it is lifted 12 to 14 ft. in its flight. It should be aimed at a point approximately eight to ten yards in front of the further goal post, so that it becomes dangerous for the goalkeeper to try to get out to make a catch.

The correct way to tackle an opponent. The ball is blocked by the foot and leg, and the weight is on the tackling foot.

It is a good plan to take corner kicks from the left wing with the right foot and vice versa. This causes the ball to swerve toward goal and almost eliminates the risk of putting the ball behind the goal line, the unforgivable sin of corner kicking.

Old enthusiasts still talk with delight of the uncannily accurate corner-kicking of Billie Meredith, the old Welsh international, who was able nine times out of ten to drop the ball on the head of Turnbull, his team mate, who would lie in wait for the ball about half way between the penalty spot and the far angle of the penalty area.

Kicking should be practised with both feet so that they may become equally efficient. The one-footed player will very seldom get far in the game, for the ability to kick accurately is the foundation of what is termed "ball control."

A boy may be physically perfect and may understand all the movements of the game, but he is useless as a player unless he is able to control the ball perfectly and to use it effectively by dribbling and passing.

The natural way to dribble is to tap the ball from the inside of one foot to the inside of the other, but a much more delicate touch can be acquired by using the outside of the foot. In this action the toe is turned well in and the ball pushed along with the outside of the foot. In close dribbling the ball must never be allowed to travel more than one full stride ahead and the player must practice and practice until he can dribble along a straight line, say the touch line, using each foot alternately without allowing the ball to be pushed off the line. The chief points to remember are to coax the ball rather than kick it, keep it within a yard of the foot, and keep the body forward with the knee and head over the ball.

Two of the cleverest dribblers of recent times, Alec James of the Arsenal and Bestall, ex-Grimsby, were such masters of the ball that it seemed to be tied to their bootlaces, but these two players never dribbled merely to display their cleverness. The moment they had drawn the defence to them and a way through had been opened up for a colleague, away went the ball to the better placed man.

The object of the dribble is to hold the ball only until it can be passed to advantage, and it must then be passed into the empty space ahead of the player to whom it is given, not straight at him. This gives the player a chance to take the ball in his stride at full speed. Never look toward the player to whom you intend to pass. The opponents will spot the move and cover the gap.

The main ways of passing the ball are the long pass, e.g. from wing to wing with a plain kick, and the short pass to a nearby player.

In making the short pass with the outside of the foot try to swerve the body in the opposite direction in an effort to deceive the opponent and make him move the wrong way, thus preventing him from intercepting the pass. In making a push pass with the inside of the foot be careful to use the inside of the instep and not the toe joint.

Biddlestone, the Aston Villa goal keeper, is here seen making a save and evading a tackle from Drake, the Arsenal and international centre-forward.

So far we have considered only how to use the ball when it is already in our possession but obviously we must consider also how to gain possession of the ball. This is done, of course, by trapping the loose ball, intercepting passes, and by tackling and charging the opponent in possession.

In trapping any type of ball, the aim should be to kill the movement of the ball and get it moving toward the opponent's goal again in one action. The best way to trap a bouncing ball is to place the foot upon it just after it has bounced and has lifted two or three inches from the ground. The action can be carried out with the ball of the foot with the knee well over the ball, but it is better to do it with the inside or the outside of the foot, because it is more easy to drag the ball forward immediately when it is taken in this way. A high travelling ball may be nodded to the feet with the head, or if it is too low for heading it should be allowed to strike the chest so that it falls dead at the feet. To do this, bend the body well forward, brace the stomach muscles and draw in the stomach.

Matt Busby, the Liverpool wing half-back, is one of the cleverest exponents of the art of "killing" the ball that I know, and every young player who can should take an opportunity of watching his methods. No matter how the ball comes to him, he seems to have it on the ground and moving forward in the twinkling of an eyelid.

Tackling and charging to obtain possession of the ball from an opponent are so closely allied that they can properly be taken together, and two of the accompanying photographs will do much to make the subjects obvious. They show respectively the right way of tackling and charging.

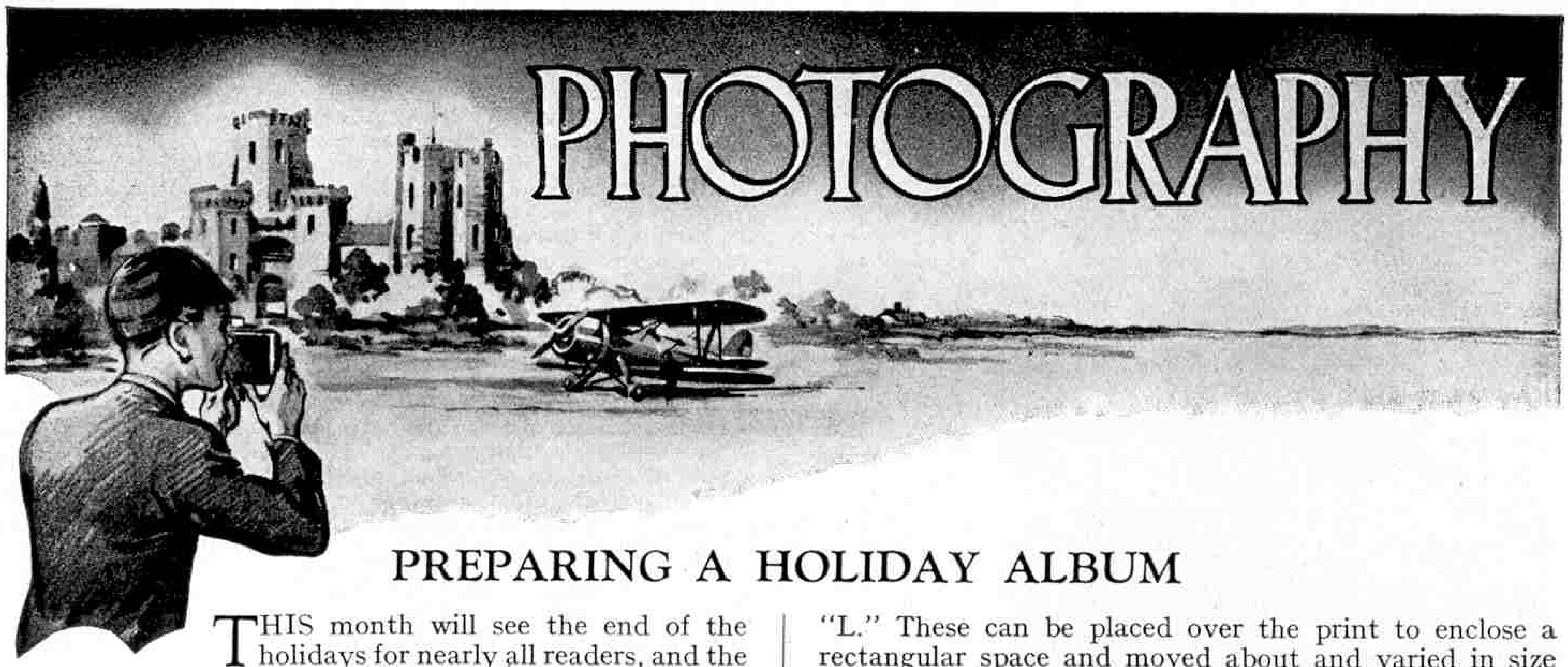
In tackling, the aim should be to block the ball by planting the foot firmly in front of it, getting the body well above it and at the same time using the shoulder gently but firmly to force the opponent off his balance. It is not necessary to be so vigorous as to floor him; enough weight to cause him to falter in his stride is sufficient.

Charging is one of the healthiest features of football, but at no time may it become violent. The arm and elbow must be held motionless close to the body so that the charge may be delivered shoulder to shoulder. Remember that the goalkeeper may be charged only when he is holding the ball.

In heading, the ball must be watched up to the moment of impact. Throw the head back and automatically the right part—the top of the forehead—will be used. A sharp flick of the head with the neck muscles adds power to the blow.

There is not space in this article to deal with the individual requirements of the special positions of the players, but every boy as soon as he takes up the game should make up his mind as to the position that suits him best and he should concentrate upon learning the special requirements of that position. Similarly, he should familiarise himself with the rules and general tactics of the game so that he may speedily fit into his side and become part of the team, not just an isolated unit.

A very helpful book on all these points has been published by the Football Association in conjunction with Evans Bros. Ltd., price 6d. Its title is "*Association Football*," and I recommend every one of my readers to get hold of a copy of that booklet and to study it. No one who reads it can fail to improve his game.

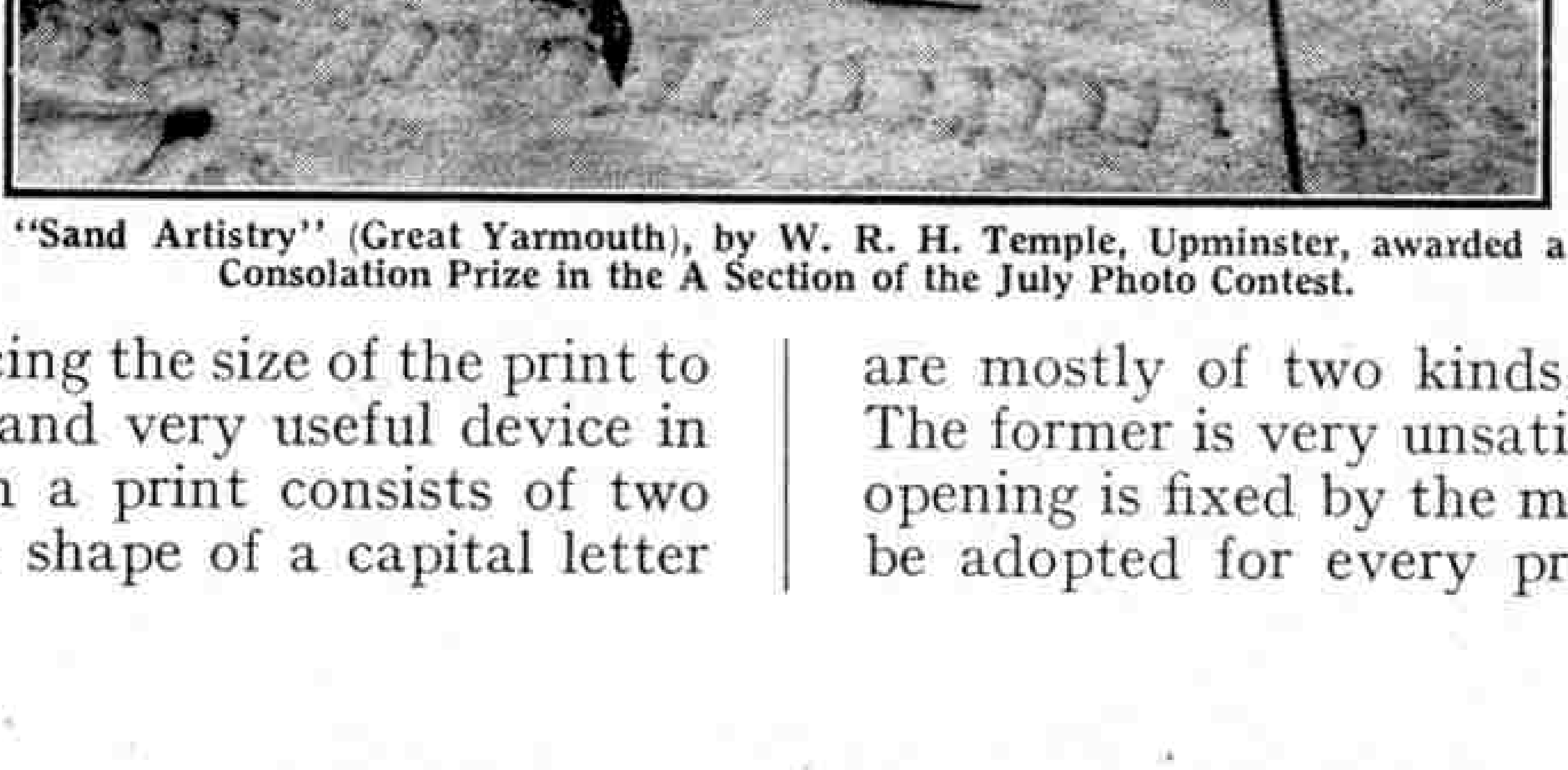


PREPARING A HOLIDAY ALBUM

THIS month will see the end of the holidays for nearly all readers, and the photographic enthusiasts will have a good stock of negatives in hand. The next step is to produce from these negatives an album of prints that will form a permanent holiday record that can be turned to with pleasure during the long winter evenings.

"Making Nets at Whitby." A very charming entry in the A Section of the June Photo Contest by A. G. Dell, West Norwood, London S.E.27.

First of all, two or three good gaslight prints should be made from each negative, and the best print put on one side for the album. It is well worth while to take a little trouble at this stage to obtain the best possible print that the negative will give, and readers who are not thoroughly familiar with the process should read over again the article in our July issue, where the subject was dealt with in close detail. Prints intended for the album should be fixed and washed with special thoroughness to ensure that they will be permanent. Many boys, in their impatience to see their efforts completed, cut these processes short, with the result that after a few months the prints discolour and fade.



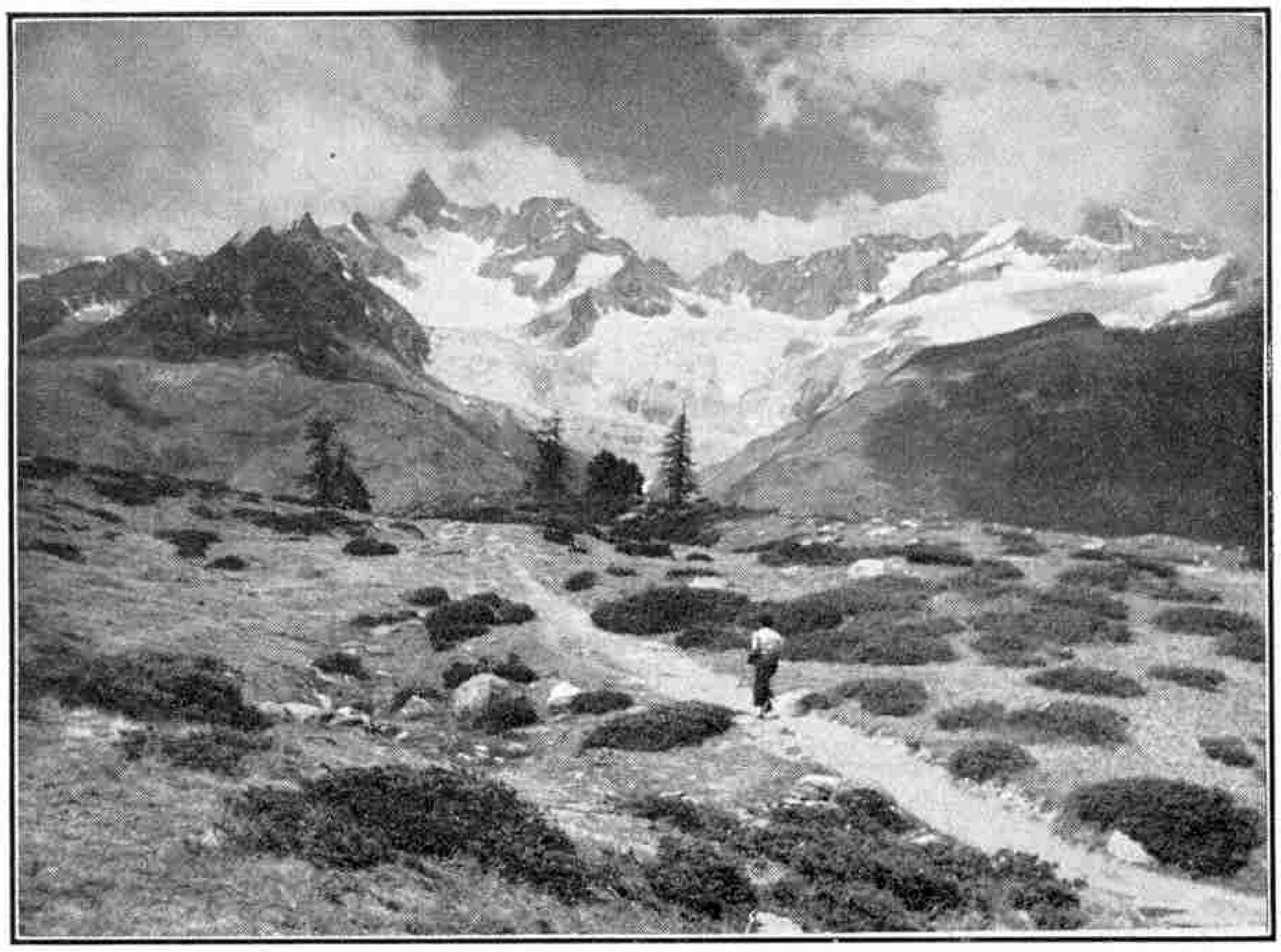
"Sand Artistry" (Great Yarmouth), by W. R. H. Temple, Upminster, awarded a Consolation Prize in the A Section of the July Photo Contest.

When good prints have been prepared from all the negatives in this manner they should be examined carefully one by one with a view to trimming them in the best way. Very often a print will be found to include something that is not wanted, and which tends to spoil the picture. All such things should be trimmed away, even though this involves reducing the size of the print to a considerable extent. An old and very useful device in deciding the best way to trim a print consists of two pieces of cardboard cut to the shape of a capital letter "L." These can be placed over the print to enclose a rectangular space and moved about and varied in size until the most attractive portion of the print is found.

Trimming will also do a good deal towards straightening up a photograph that was taken with the camera not quite level. Often, for example, one sees prints of seascapes in which the sea appears to be running away downhill, due to the camera having been tilted to one side when the exposure was made. In trimming such a print, the top and bottom edges should be cut parallel with the horizon line of the sea. In architectural pictures, where the camera has been tilted to one side and buildings seem to be leaning sideways in consequence, the proper appearance can be restored by trimming the sides of the print parallel with some known vertical line in the picture. On the other hand, no amount of trimming will correct faults caused by pointing the camera upward in an attempt to photograph the top of a church tower, or other tall building, from a near viewpoint on the ground level. In such pictures, the buildings seem to be falling away from the camera.

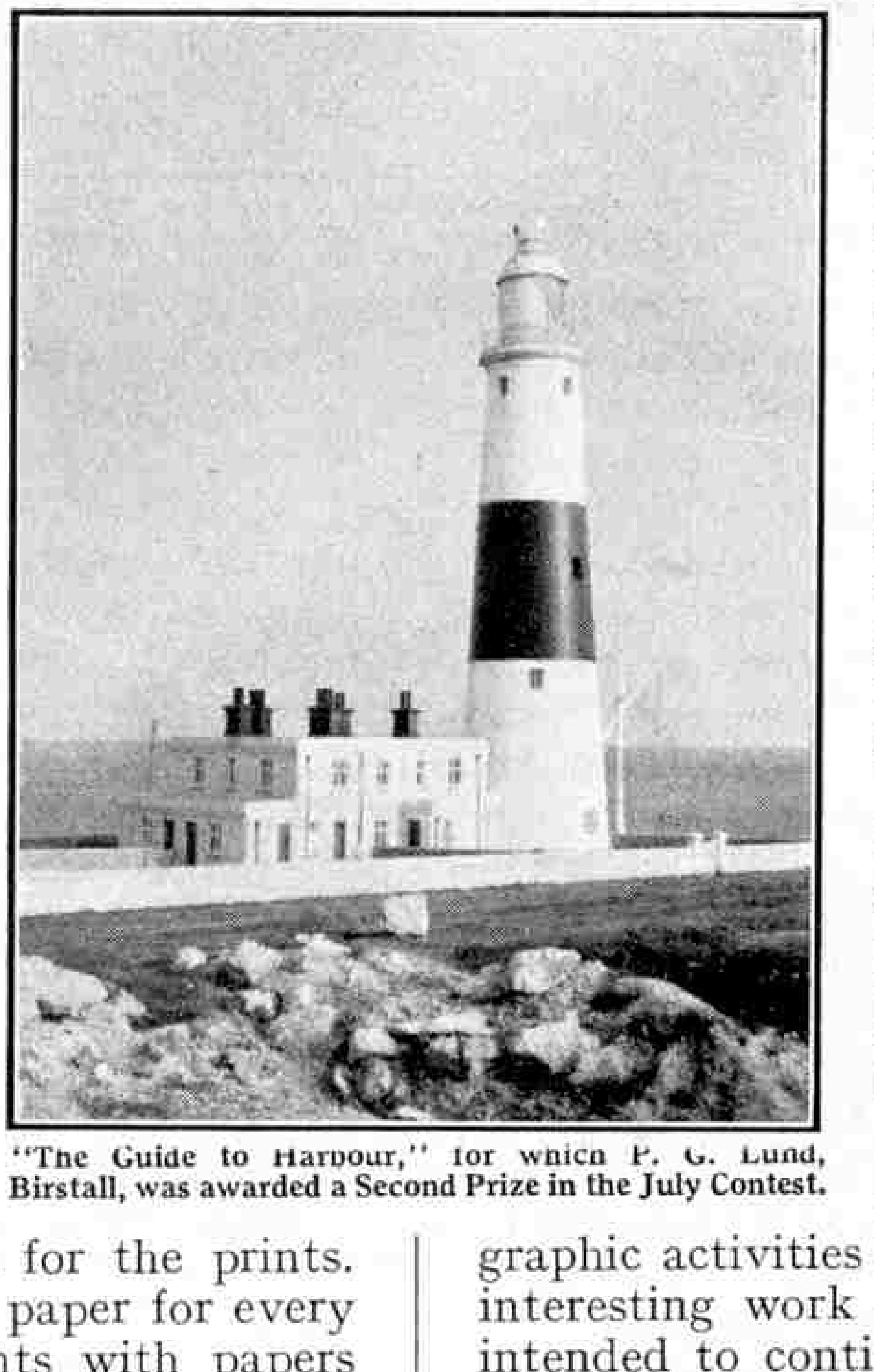
The trimming is best done with a sharp penknife and a steel ruler. It is often recommended that the print should be laid on a sheet of glass, but this blunts the knife very quickly. It is far better to use a sheet of fairly thick cardboard.

Albums for photographs are mostly of two kinds, the slip-in and the paste-on. The former is very unsatisfactory because the size of the opening is fixed by the manufacturer, and this size must be adopted for every print. The paste-on album with plain pages is far better because it allows the insertion of prints of any shape or size that may be preferred. An album with fairly thick card leaves is better than one with paper leaves. The pages should be planned out in advance, and if possible matters should be arranged so that there is as much continuity as possible about the subjects. Dealing with each page separately, place on it the selected prints and move these about until the most suitable arrangement has been found. Then make a tiny pencil mark at the corner of each print to act as a guide for mounting the prints.



"In the High Alps"—Above Zermatt, F. Culverhouse, Sheffield. This striking picture was awarded First Prize in the A Section of the July Photo Contest.

The mounting should be done with one of the special photographic mountants that are available. Ordinary paste, gum or glue should never be used. Lay the print face downward on a sheet of newspaper, and with the finger-tips spread the mountant thinly and evenly all over the back of the print. Lift the print carefully, and place it in the position previously decided upon on the leaf of the album. Lay a clean piece of newspaper over it, and gently rub it into contact. Special attention should be given to the edges and corners to make sure that these are really fixed in place. It may be found that a little of the mountant is squeezed out at the edges of the print, and if so this should be wiped away quickly with a piece of clean rag. When all the prints have been mounted, the album should be placed under light pressure, such as that of a few books, for 24 hours to prevent the leaves and prints from "cockling" as the mountant dries.



"The Guide to Harbour," for which P. G. Lund, Birstall, was awarded a Second Prize in the July Contest.

The final step is to write as neatly as possible a caption under each print. This may be either a brief title of a few words or a short description of the scene or incident. In every case, however, the date and the place where the photograph was taken should be included.

Before leaving the subject it may be useful to say a few words about the kind of gaslight paper to be used for the prints. Many readers seem to use one grade of paper for every subject, and never to make experiments with papers with different surfaces. The average holiday snapshot probably looks best on paper with a semi-matt surface; but some subjects in which a lot of detail occurs look better on glossy paper. There are certain papers to be had with a rough canvas-like finish. These are splendid for enlarged prints of considerable size, but they should not be used for very small prints as the result is too coarse. Prints from negatives made with miniature cameras almost always look best on glossy paper. Great fun is to be had in obtaining gaslight prints of different colours by means of various toning processes. Green prints for landscapes are very attractive and blue seascapes are also quite good. The only point to be remembered is that these toned prints should be kept to themselves. A page of an album with some of the prints green, others blue, and the remainder black looks almost as if it had measles!

When the album is finally complete, the pictures it contains should be looked over carefully with a view to selecting some of the best ones for entry in the *"M.M."* photographic contests. A really first-class print should then be made from each of the negatives concerned. A suitable title, short but "snappy," should be thought out for each print. A good title will not win a prize for a poor print, but it will certainly help in the case of a good one. Many readers who enter for the *"M.M."* competitions give their prints titles that describe the scene quite well but do not say what it represents. For instance, a photograph taken at a fishing village might be described only as "Evening on the Quayside." This is quite good, but competitors would do well to give the actual name of the place in order to add to the interest.

It may be helpful to readers to know that the prizes in these contests are awarded to the best individual prints, and in cases where a competitor submits several prints for one contest, each is judged individually.

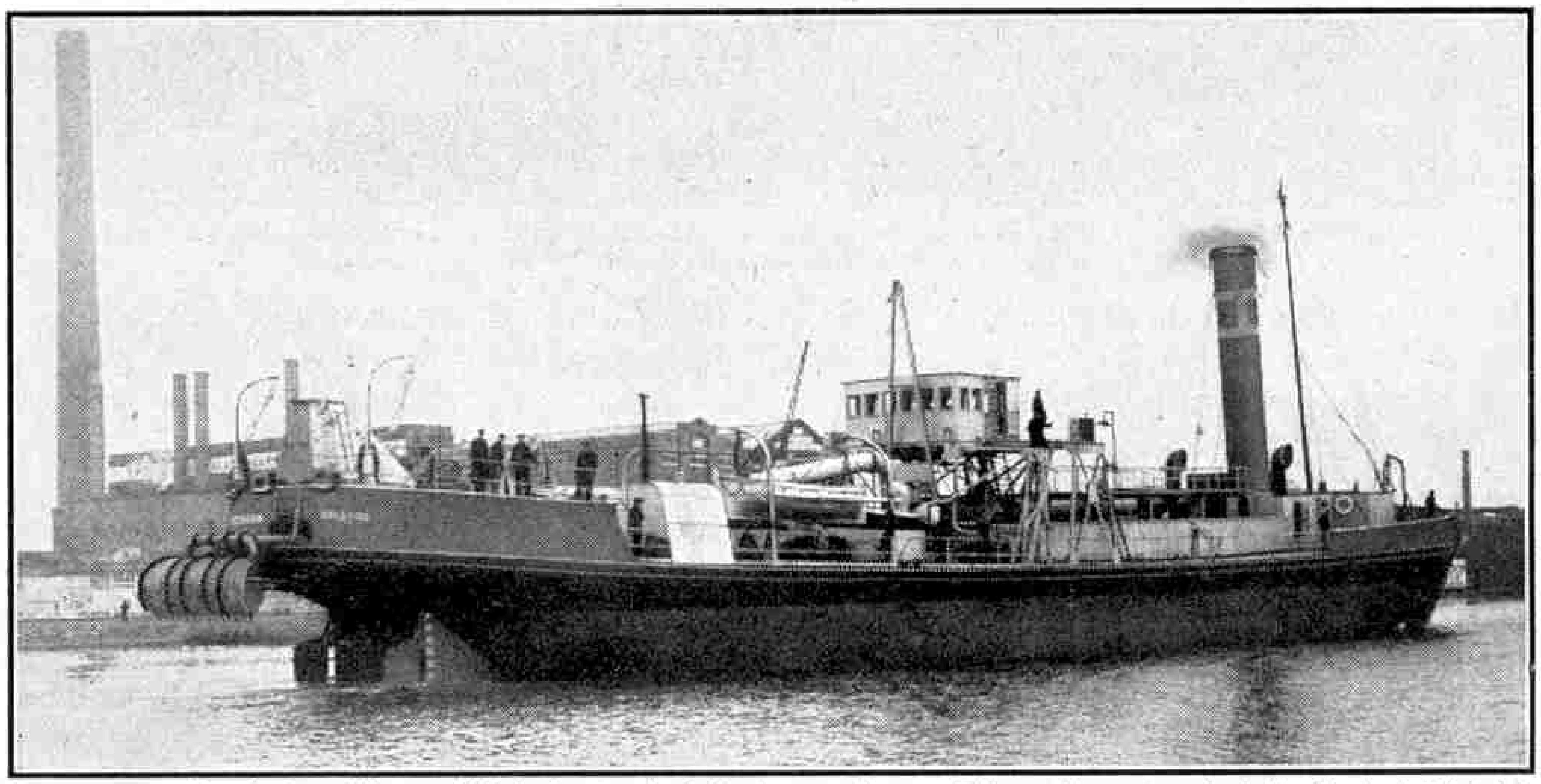
In our next issue we shall commence a series of articles dealing with photographic activities in winter time. There is quite a lot of interesting work that can be done indoors, and it is intended to continue the photographic competitions in connection with these winter articles. Every reader will find much to interest him in these articles and competitions.

Dredging 100 Tons of Mud per Minute

Remarkable Vessel at the Port of Bristol

By Basil Greenhill

THE tides round much of the British Coast are such that the harbours are constantly becoming silted up, and continuous dredging operations are necessary to keep them clear. This is nowhere more essential than in the Bristol Channel, where the River Severn deposits millions of tons of fine silt every year. In order to keep the locks and channels clear, the chief ports of the estuary, Cardiff, Barry, Swansea and Bristol, all maintain large and powerful dredgers that work whenever the tide will allow. The port of Bristol, situated at the head of the Channel, suffers from silting to a very great extent, and in order to keep pace with the rate of deposit of the river the most powerful vessels are required. The finest of these, the S.D. *"Severn,"* shown in the illustration on this page, is one of the most remarkable dredgers ever constructed.



The steam suction dredger "Severn." It is the finest of the large and powerful vessels employed at the Port of Bristol in keeping the River Severn clear of silt. Photograph by courtesy of W. Simons and Co. Ltd., Renfrew.

She was built by W. Symons and Co. Ltd., Renfrew, and completed in December 1919. After successful tests she was handed over to the Port of Bristol Authority and placed in service in connection with the Avonmouth branch of Bristol Docks. Since then she has remained constantly at work, and in spite of her age she is still one of the most powerful vessels of her type afloat.

The *"Severn"* is a dredger of the suction type; that is to say the mud is raised from the sea-bed by means of suction pumps, and not by a continuous chain of scoops as in the more common type of bucket dredger. She is propelled by twin screws driven by triple expansion engines of 172 h.p., and with a full load her maximum speed is about six knots. Her gross tonnage is about 990.

The mud is drawn up a suction tube 2 ft. in diameter and is pumped into a tank of 1,000 tons capacity, and the maximum working depth is 30 ft. The suction is created by a rotary pump driven by a single cylinder compound engine at 180 revolutions per minute, and when working at normal speed this pump lifts 100 tons of mud per minute from the sea-bed to the storage tank. The pump is about 8 ft. in diameter and the blades are 11 in. wide. Some idea of its power may be gained from the fact that it once raised a rock weighing a hundredweight.

When dredging is to commence the suction tube casing is first lowered to the sea-bed. This casing contains the main tube and a smaller pipe about 9 in. in diameter; and at the end of the tubes is a spiked grab that loosens the mud preparatory to its being sucked up. In order to aid the process of loosening, water is pumped at high pressure down the smaller pipe and sprayed out of small holes between the spikes of the grab. As soon as the casing has been lowered, both suction and water pumps are started and the dredger moves slowly forward dragging the grab over the sea-bed. This is continued for some ten minutes, the vessel moving backward and forward over the area to be dredged. As soon as the storage tank is full the suction tube casing is raised and the *"Severn"* steams out to the mud dumping ground about three miles out to sea from Avonmouth. Here the mud is pumped overboard, and the dredger then returns to port to continue work. In this way, working whenever the tide will allow, some 10,000 tons of mud are dredged every day and the channel to the docks entrance is kept clear for every class of vessel.

The *"Severn"* was specially constructed to be a seagoing ship as well as a dredger, and she can work in a full gale if necessary. She is fitted with wireless apparatus, and her officers and crew live on board and keep watches just as do the crew of an ocean liner.

When dredging at night work is carried on under the light of powerful arc lamps that are arranged so as to illuminate every important point on deck. The auxiliary machinery is worked by steam, and most of the dredging engines are controlled directly from the bridge.

As may be expected, many things besides mud are dredged up from time to time. Once extensive repairs to the pumps were necessary after a piece of railway iron had become mixed up with the blades. On another occasion a lady's handbag containing money and keys was raised, and duly returned to its astonished owner, who had dropped it from a pleasure steamer several weeks before. The most interesting article ever dredged up was a case containing six Webley revolvers, all in perfect condition! The origin of these is an unsolved mystery.

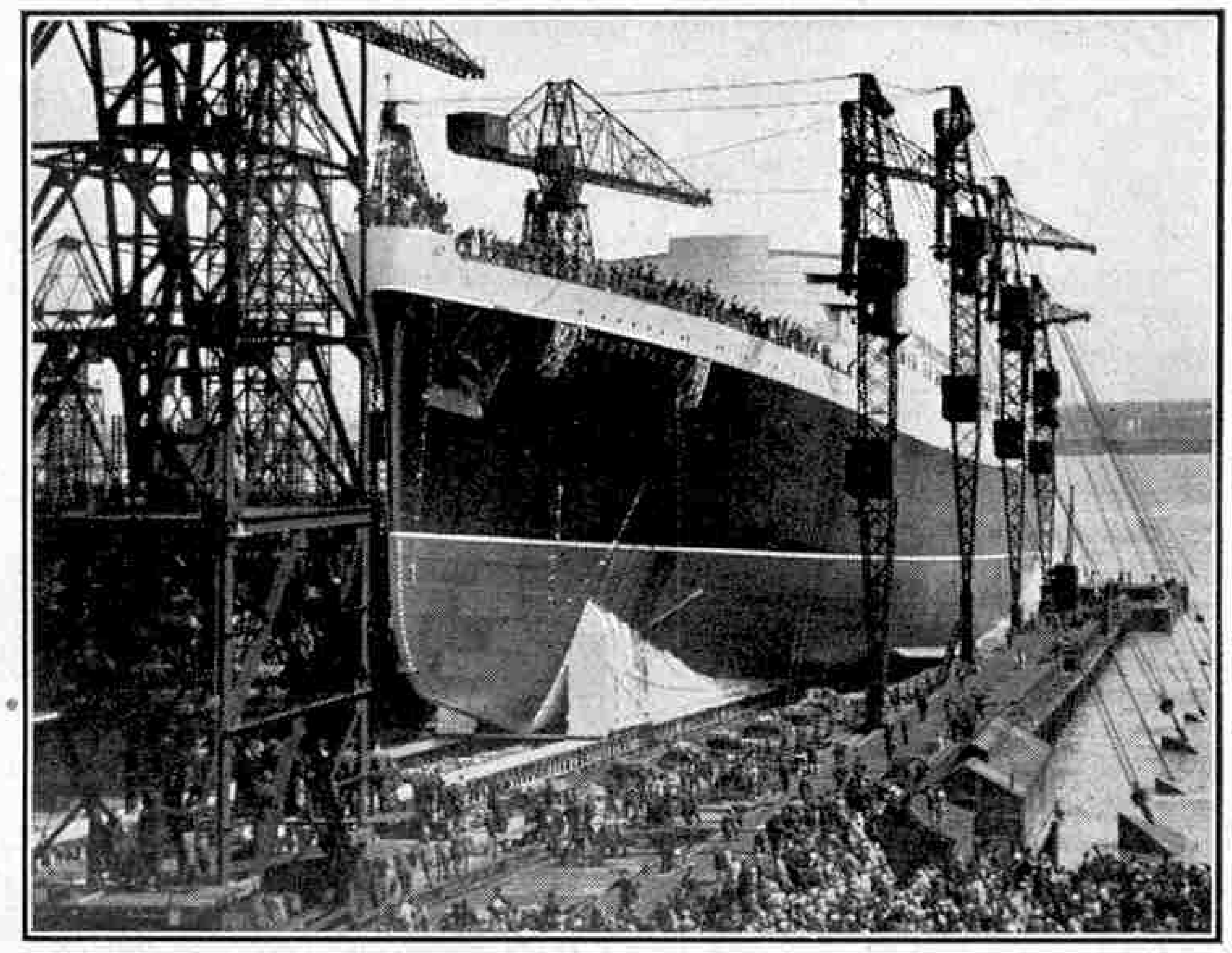
It is estimated that during her life time the *"Severn"* must have dredged over forty million tons of mud. She is shortly to undergo an extensive overhaul, after which it is expected that she will be fit for many more years of service.

Launch of the "*Mauretania*"

Largest Vessel Built in An English Shipyard

ON Thursday 28th July the new Cunard White Star liner "*Mauretania,*" the largest ship ever built in an English shipyard, was launched in the Mersey. She was built at Birkenhead by Cammell Laird and Co. Ltd., and the yards of her builders and every available vantage point along the shores of the Mersey were crowded with onlookers as she entered the water.

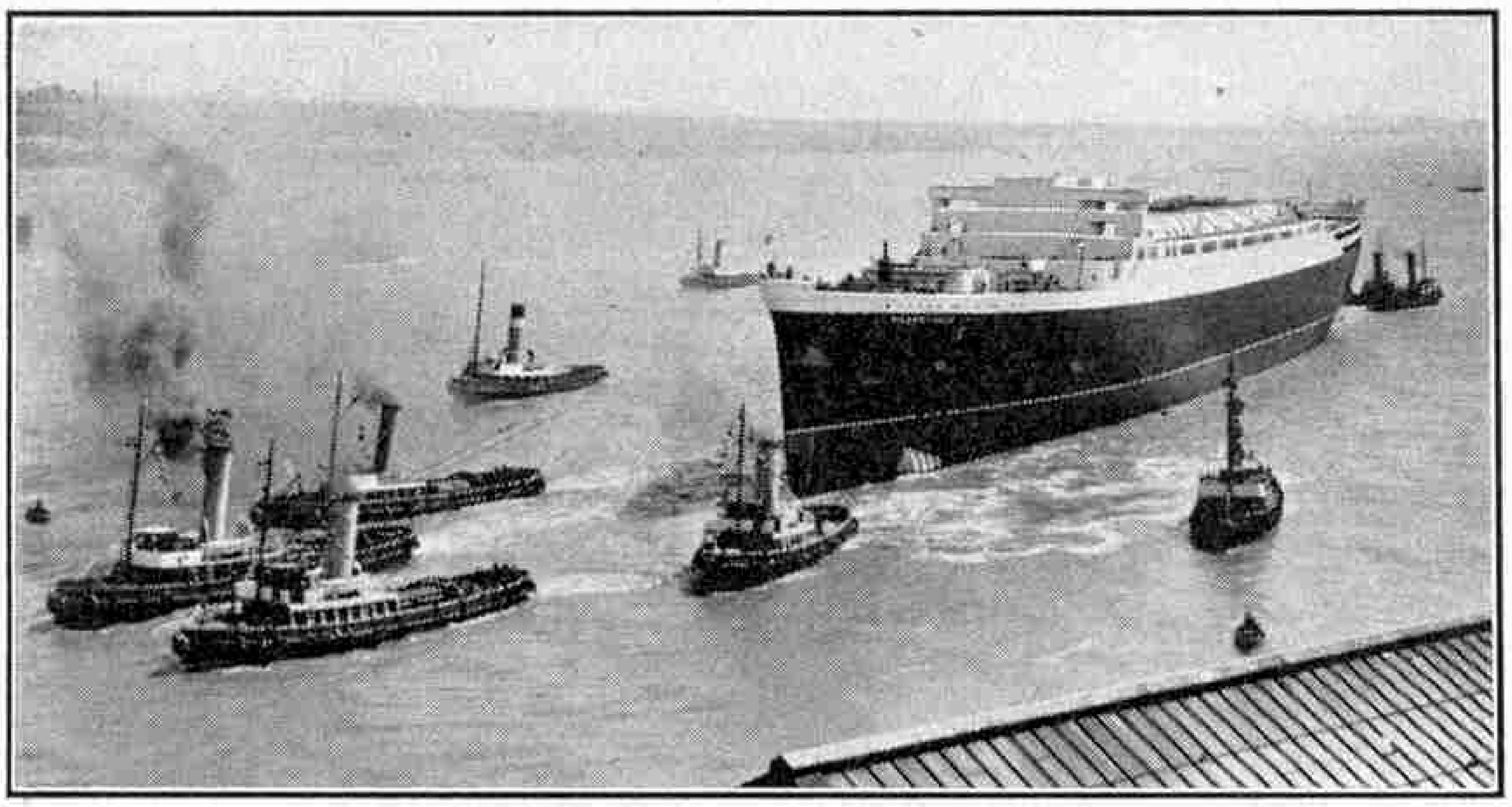
The new "*Mauretania*" is 772 ft. long, and her gross tonnage will be approximately 34,000, and thus she will be larger than her famous predecessor by about 2,000 tons. Her keel was laid down on 24th May of last year, so that her hull was completed, ready for launching, in the comparatively short time of 14 months. The building berth used was that on which the aircraft carrier H.M.S. "*Ark Royal*" and the battleship H.M.S. "*Rodney*" had previously been constructed.



The "Mauretania" sliding down the ways a few seconds after the launching button had been pressed. The photographs on this page are by T. C. L. Hutchinson, Liverpool.

The launching ceremony took place in perfect summer sunshine and was a brilliant spectacle. The central figure was Lady Bates, wife of Sir Percy Bates, Chairman of Cunard White Star Ltd., who made no mistake in her task of swinging the traditional bottle of champagne against the bows of the vessel vigorously enough to shatter it. Then followed an unusual scene, the first of its kind. The name "*Mauretania*" was already in position on the bows of the vessel, where it was covered by British and United States flags. By pressing a button on the launching platform these were drawn aside to reveal it.

Then the launching button was pressed, and in a few seconds, with the good wishes of her launcher and of the vast crowd for a career as successful as the old "*Mauretania,*" the immense bulk of the vessel began to slide down the ways into the water.



The "Mauretania" in the water, with eight tugs guiding her to the fitting-out basin. The width of the Mersey at this point allowed the vessel to be launched freely, without drag chains to check her run.

When the new "*Mauretania*" was released she was given her freedom in every sense of the word. The Mersey is very wide opposite the Birkenhead shipyards, and she was therefore allowed to run freely into the water, no chains or other artificial means of checking her progress being necessary. This was one of the most impressive features of the entire event. Her curved stern raised a great wave as she plunged into the water, with launching timbers churning under and away from her, and as she ran out towards the middle of the river she swung round and was carried upstream by the still rising tide. Eight tugs were waiting to take charge when her port anchor splashed into the river, and within ten minutes she was being towed to the fitting-out basin, where she joined the aircraft carrier "*Ark Royal.*"

The work of installing the machinery and equipping the great vessel will now go forward at high speed, and she will be completed in time to make her first sailing from London early next summer. She will be the largest liner regularly making her entry into the Port of London, and she will sail from the King George V Dock.

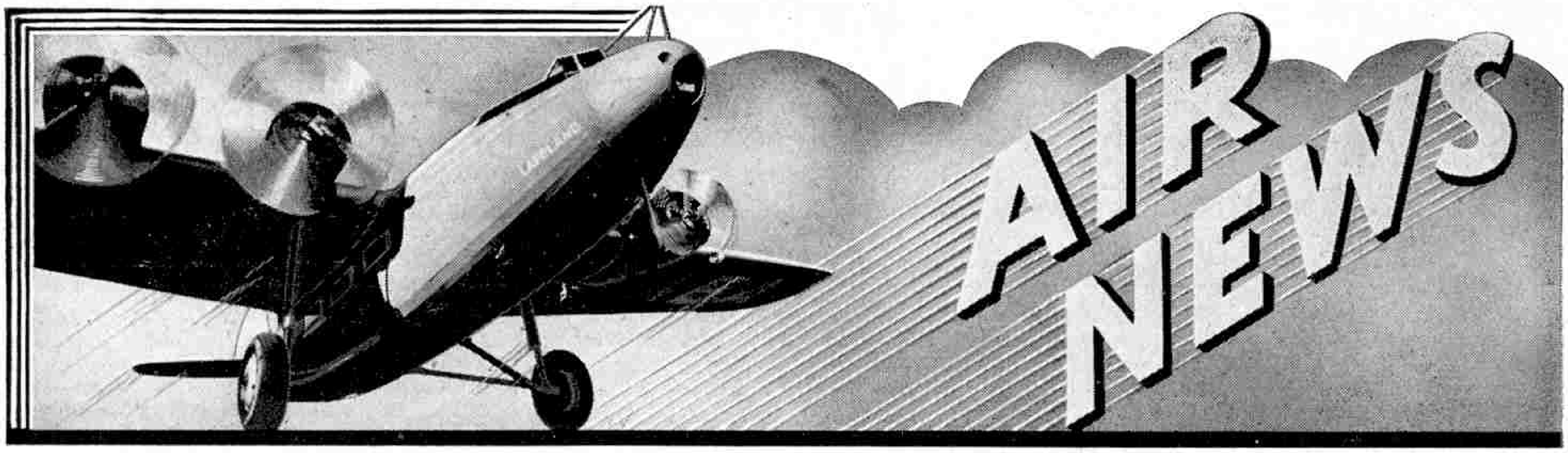
The "*Mauretania*" is a handsome vessel with modern lines. She has a marked sheer, which is unbroken by well decks, and her cast steel stem has a forward rake that is not too pronounced. She has a cruiser stern. Her hull is divided by 13 main watertight bulkheads across her width, and her double bottom is divided into 37 compartments that will be used for storing water, lubricating oil and reserve oil fuel. She has 10 decks, some of which are partial, that is they do not extend over her full length.

The propelling machinery, now in course of construction at Birkenhead by Cammell Laird and Co. Ltd., consists of two sets of Parsons geared turbines. Each set includes a high-pressure, an intermediate-pressure and a low-pressure turbine, driving separate pinions, each of which engages with a single large gear wheel. The gear wheels weigh 85 tons each, and are said to be the largest ever made for a merchant ship. Turbines for going astern are provided in the casings of the intermediate and low-pressure turbines. The propellers are of manganese bronze, and weigh 25 tons each, and each line of shafting connecting these with the turbines has a total length of 243 ft. 4 in. and weighs 156 tons.

Steam for the turbines is supplied by six oil-fired water tube boilers built under license from Yarrow and Co. Ltd., Scotstoun. Each boiler has five drums, which were hollow-forged by the English Steel Corporation Ltd., and the quantity of water that normally will be evaporated in an hour in each is more than 30 tons.

The general equipment of the vessel will be on the lavish scale necessary in modern high class liners. The electric generating plant, situated in a separate watertight compartment between the two boiler rooms, includes four turbo-generators with a capacity of 800 kW each, and will supply about 15,000 lights, over 200 heaters and 300 motors. In addition to this plant there is an emergency set with a Diesel-engine drive that has a capacity of 75 kW, and a 220-volt battery can maintain the lighting and other essential services for a period of half an hour if by any remote chance there is a complete failure of the generating plant.

There will be an unusually extensive radio installation for both telegraphy and telephony, and passengers will be able to take calls from shore stations in telephone call boxes placed near the lifts in the entrances to the vessel. The installation also is designed for broadcasts from the ship, both to Europe and North America. Modern direction-finding apparatus will be installed, and it is interesting to recall that the first experiments with the type now in use were made in 1912 by the Marconi Company on the old "*Mauretania.*"



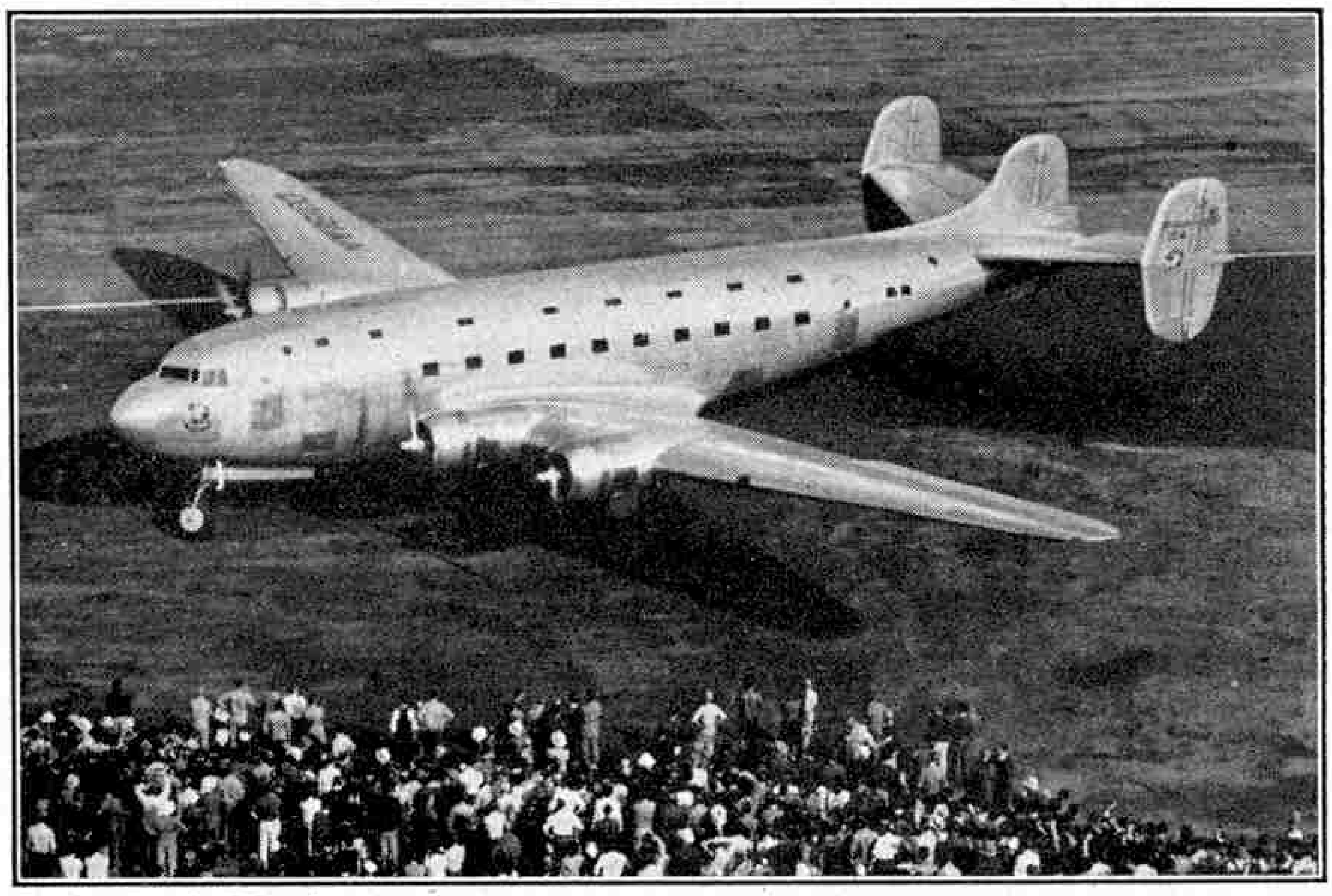
"Mercury" Makes First Atlantic Commercial Flight

The first commercial flight over the projected North Atlantic air route was accomplished on 20th–21st July by *"Mercury,"* the long-range seaplane that forms the upper component of the Mayo Composite aircraft. It was launched in mid-air from the lower component *"Maia"* soon after the composite aircraft took off from Foynes, in the Irish Free State, and 13 hrs. 29 min. later the seaplane passed over Cape Bauld, Newfoundland, a record for an east to west Atlantic crossing. The previous best time was 14 hr. 24 min., set up by the Empire flying boat *"Cambria"* in August 1937 during one of the experimental Atlantic flights carried out last year.

"Mercury" did not call at Botwood, Newfoundland, but flew on to Boucherville, Montreal, where she landed 20 hrs. 20 min. after leaving Foynes, 2,860 miles away. After a brief halt the seaplane took off for New York, and 2 hr. 11 min. later descended on the water in Manhasset Bay, Port Washington, Long Island. *"Mercury"* was piloted on this important flight by Capt. D. C. T. Bennett, with A. J. Coster as wireless operator. In addition to the crew and a heavy load of fuel the seaplane carried about half a ton of news reels, photographs, and newspapers, reporting the arrival of the King and Queen in Paris and their State drive through the city. In this way people in Canada and the United States were given the opportunity of having up-to-the-minute films and newspapers that were the first to be rushed across the Atlantic by air express.

The return flight began on 25th July and was carried out in stages by way of Montreal, Botwood, the Azores and Lisbon, *"Mercury"* taking off at each stage as an ordinary seaplane. The longest stage was the Atlantic crossing from Botwood to Horta in the Azores, a distance of 1,440 miles, and this was covered in 7 hr. 38 min. The seaplane arrived back at Southampton in the evening of the 27th July.

"Mercury" is scheduled to make a second Atlantic flight toward the end of this month, and a third one in October.


The first Douglas DC-4 about to take off for its maiden flight, the first of a long series of test flights. This huge four-engined air liner has a wing span of 138 ft., and a range of 2,200 miles, and will carry 42 passengers and a crew of five. Photograph by courtesy of the Douglas Aircraft Company, Inc., U.S.A.

Two return flights will also be made by *"Cabot,"* one of an improved type of Imperial Airways flying boat that will be capable of carrying a bigger load than the flying boats employed in the Atlantic tests last year. *"Cabot"* will make its ocean flights towards the end of this month and about the middle of October. There will also be two return flights by a machine of the "Albatross" type, and another "Albatross" will fly to New York and remain on the American side of the Atlantic to carry out survey flights there under winter conditions. The first "Albatross" will make its crossings of the Atlantic about the middle of this month and early in October. Captains and crews for all flights will be provided by Imperial Airways, and the whole programme will be carried out jointly by the company and the Air Ministry.

A Stainless Steel Aeroplane Test

Reference was made in the June *"Air News"* pages to investigations in America into the possibility of using stainless steel in aircraft construction, particularly in regard to the wings, and to the favourable claims being made for it. In Philadelphia a stainless steel aeroplane, stripped of all fabric covering, has been on view in front of the Franklin Institute for the past six years. During that time it has been exposed to the atmosphere and to all rain and snow. It was inspected recently and was found to be in excellent condition.

Atlantic Flown by Accident!

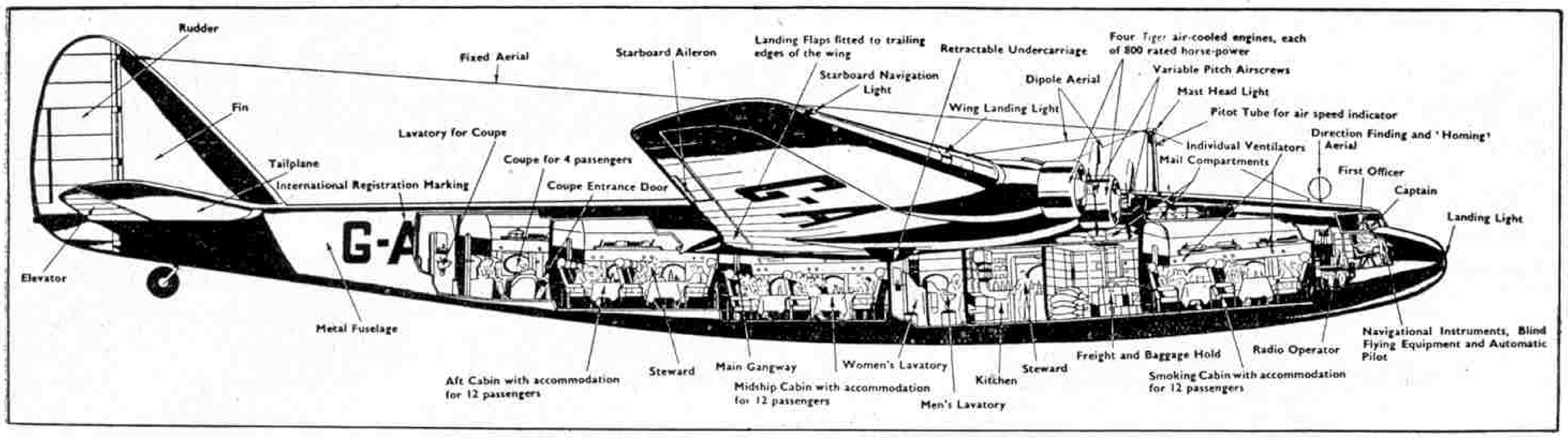
An astonishing solo flight across the North Atlantic was accomplished on 17th–18th July by Douglas Corrigan, a young airman employee of a Los Angeles aviation company. He took off from the Floyd Bennett Airport, New York, early on 17th July and reached Baldonnel aerodrome, Dublin, in 28 hrs. 13 min. A few days previously he had flown non-stop from Long Beach, California, to New York, a distance of 3,200 miles. Corrigan had informed the officials at Floyd Bennett Airport that he was departing on a non-stop flight to California, but to their amazement he set off eastward and headed straight out over the Atlantic. His machine was an eight-year old Curtiss single-engined high wing monoplane that he had bought for £180, and as it was not fitted with a wireless transmitter nothing was heard of him until he landed at Baldonnel aerodrome.

Corrigan's remarkable story was that he had never intended to fly the Atlantic, but that his compass had gone wrong, so that he was heading east when he thought he was travelling west! Probably the most suitable comment on this would be "Oh Yeah!"

The foolhardy nature of the flight may be gauged from the fact that his machine had no instruments except a compass, bank indicator, and inclinator to measure the steepness of climbs and descents. Additional petrol tanks had been fitted so that fuel could be carried for a flight lasting up to 36 hrs., but as these tanks were in front of the cockpit they made it impossible for him to see ahead! The Ryan single-engined monoplane *"Spirit of St. Louis"* flown by Lindbergh also had this disadvantage, but he overcame it by using a periscope.

New R.A.F. Technical School

No. 4 School of Technical Training (Men) opened at St. Athan, Glamorgan, on the 1st of this month, is the largest R.A.F. station in this country, covering over 900 acres. There are about 1,000 airmen at the school, but the number is expected to rise to 3,000 by December. Many of the 9,000 men required by next March for training as fitters will pass through St. Athan.

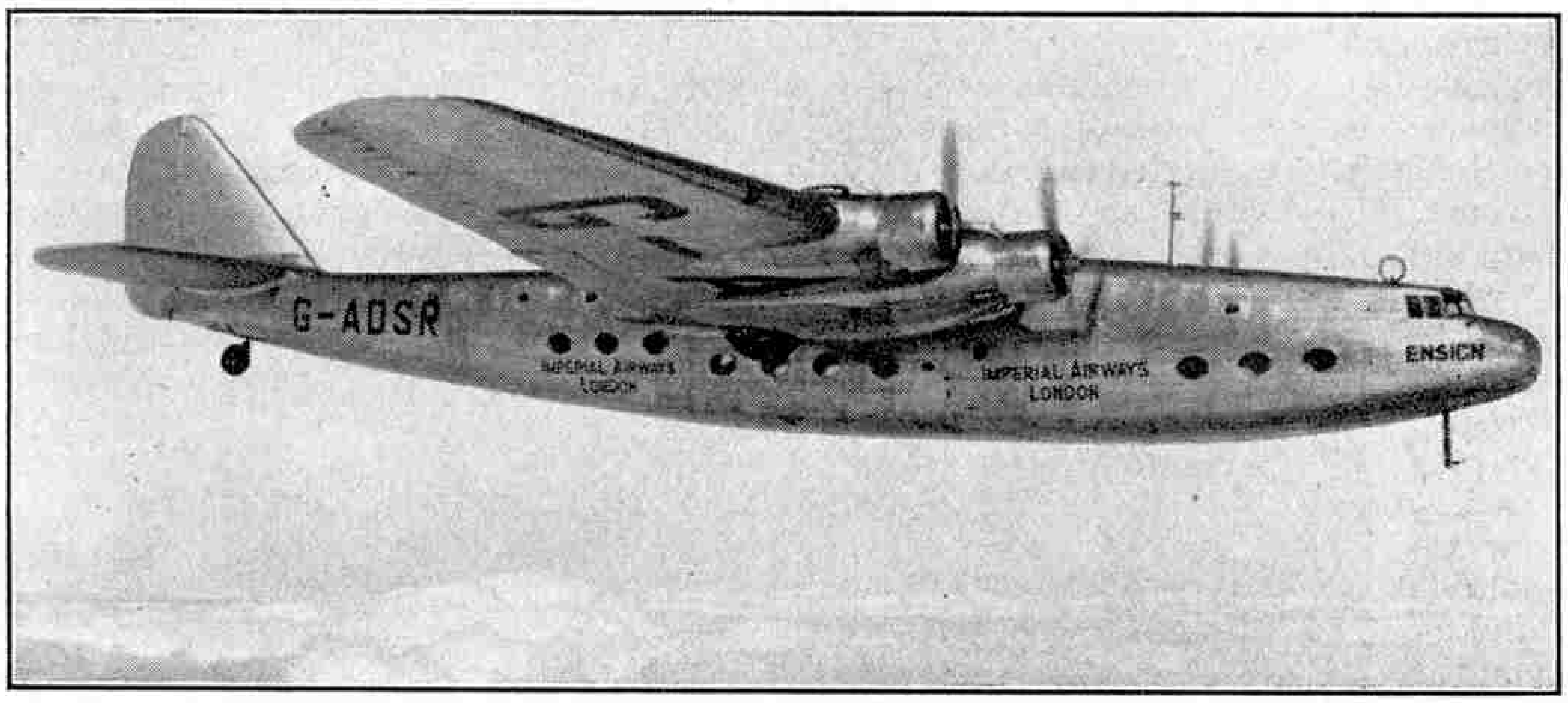

Rudder
Fixed Aerial
Starboard Aileron
Landing Flaps fitted to trailing edges of the wing
Retractable Undercarriage
Four Tiger air-cooled engines, each of 800 rated horse-power
Variable Pitch Airscrews
Starboard Navigation Light
Dipole Aerial
Mast Head Light
Wing Landing Light
Pitot Tube for air speed indicator
Fin
Lavatory for Coupe
Direction Finding and 'Homing' Aerial
Individual Ventilators
Mail Compartments
Tailplane
Coupe for 4 passengers
First Officer
International Registration Marking
Coupe Entrance Door
Captain
Landing Light
G-A
Elevator
Metal Fuselage
Navigational Instruments, Blind Flying Equipment and Automatic Pilot
Freight and Baggage Hold
Radio Operator
Steward
Main Gangway
Women's Lavatory
Steward
Kitchen
Aft Cabin with accommodation for 12 passengers
Midship Cabin with accommodation for 12 passengers
Men's Lavatory
Smoking Cabin with accommodation for 12 passengers

The internal arrangements of an Imperial Airways "Ensign" class air liner for service on the company's European air routes. There is accommodation for 40 passengers and a crew of five. "Ensigns" operating on the Empire air routes will carry 27 passengers and 1¾ tons of freight and mail. Illustration by courtesy of Imperial Airways Ltd.

"Ensign" Flies to Paris in 70 Minutes

The illustrations on this page are of the first of 14 "Ensign" or "E" class air liners now being built for Imperial Airways by Armstrong Whitworth Aircraft Ltd. During its acceptance trials recently this aeroplane flew from London to Paris in 70 min., which was a record for four-engined aircraft on the Paris route. The "Ensign" is a high wing monoplane with a span of 127 ft., and is 114 ft. long. The triple-bladed airscrews are over 12 ft. in diameter, and the four Armstrong Siddeley engines develop a total of 3,200 h.p. and enable the aeroplane to cruise at nearly three miles a minute.

This new fleet of air liners will be used on both the European and Empire air routes. "Ensigns" operating on the European services will carry 40 passengers in large, luxuriously equipped saloons, in addition to mails, freight and a crew of five. Those carrying freight and Empire air mails up to a total of 1¾ tons will have room for 27 passengers.



The graceful lines of the "Ensign" and the excellent outlook from the cabin windows are evident in this view of the first of these aircraft in the air. Photograph by courtesy of "Flight."

Learning to Fly for 2/6 an Hour

Sir Kingsley Wood, the Air Minister, recently announced the formation of a new National organisation called the Civil Air Guard. It is open to any person between the ages of 18 and 50, except those who have undertaken Reserve liability in either the R.A.F., Army or Navy, and those who join will receive their flying training at light aeroplane clubs taking part in the scheme. On Mondays to Fridays inclusive this instruction will cost them only 2/6 per hr. when given in a light aeroplane, and 5/– per hour if given in a standard training aircraft. On Saturdays and Sundays these fees will be double, but even then they will enable flying to be learned much more cheaply than hitherto. Members of the Civil Air Guard have to sign an undertaking that they will offer their services immediately any state of national emergency arises, either for employment in connection with the R.A.F. or in any other direction connected with aviation.

The public response has been tremendous, and already many thousands of applications have been received by both the Air Ministry and by light aeroplane clubs in all parts of the country. The scheme has, of course, created a sudden and great demand for additional flying instructors, and it will be several months before it is fully under way.

Proposed British Service Across South Atlantic

Plans for a British Airways regular air service between this country and South America by way of Portugal and West Africa are now well in hand. Last Autumn a survey party consisting of British Airways and Air Ministry officials visited Portugal, French Morocco, and the Canary Islands, and a second one is now in South America. This party is led by Mr. W. D. Roberts, Vice-Chairman of British Airways, and includes Wing Commander D. L. Allen, of the Department of Civil Aviation. They have gone to discuss the establishment of the South Atlantic section of the proposed service with the Argentine authorities, and at Buenos Aires they will examine the possibility of both landplanes and flying boats for the service. Later they will travel north to Rio de Janeiro, in Brazil, to examine similar possibilities and to open negotiations with the Brazilian Government. They also hope to open negotiations with the Government of Uruguay.

In readiness for the proposed service British Airways have ordered four new Lockheed 14 air liners, and as soon as these are delivered survey flights will begin over the first stage, a 1,000 miles non-stop flight from London to Lisbon.

American Aircraft for the R.A.F.

In order to assist in speeding up the expansion of the R.A.F. the Air Ministry have ordered from America 200 aeroplanes suitable for general reconnaissance duties and 200 suitable for advance training work. It is understood that the reconnaissance aircraft will be Lockheeds, similar in essential details to the commercial Lockheed 14s ordered this year by British Airways Ltd., and that the other 200 will be North American Trainers, probably similar to those now being supplied to the Royal Australian Air Force. The North American Trainer is a single-engined low wing monoplane with enclosed cockpit.

British-built training aircraft have not been overlooked, and the Air Ministry have ordered a large number of Miles "Kestrel" Trainers, and also have placed a further order for Airspeed "Oxford" training aeroplanes. Both these types have been illustrated and described in the *"M.M."*

A Luxury "Flying Yacht"

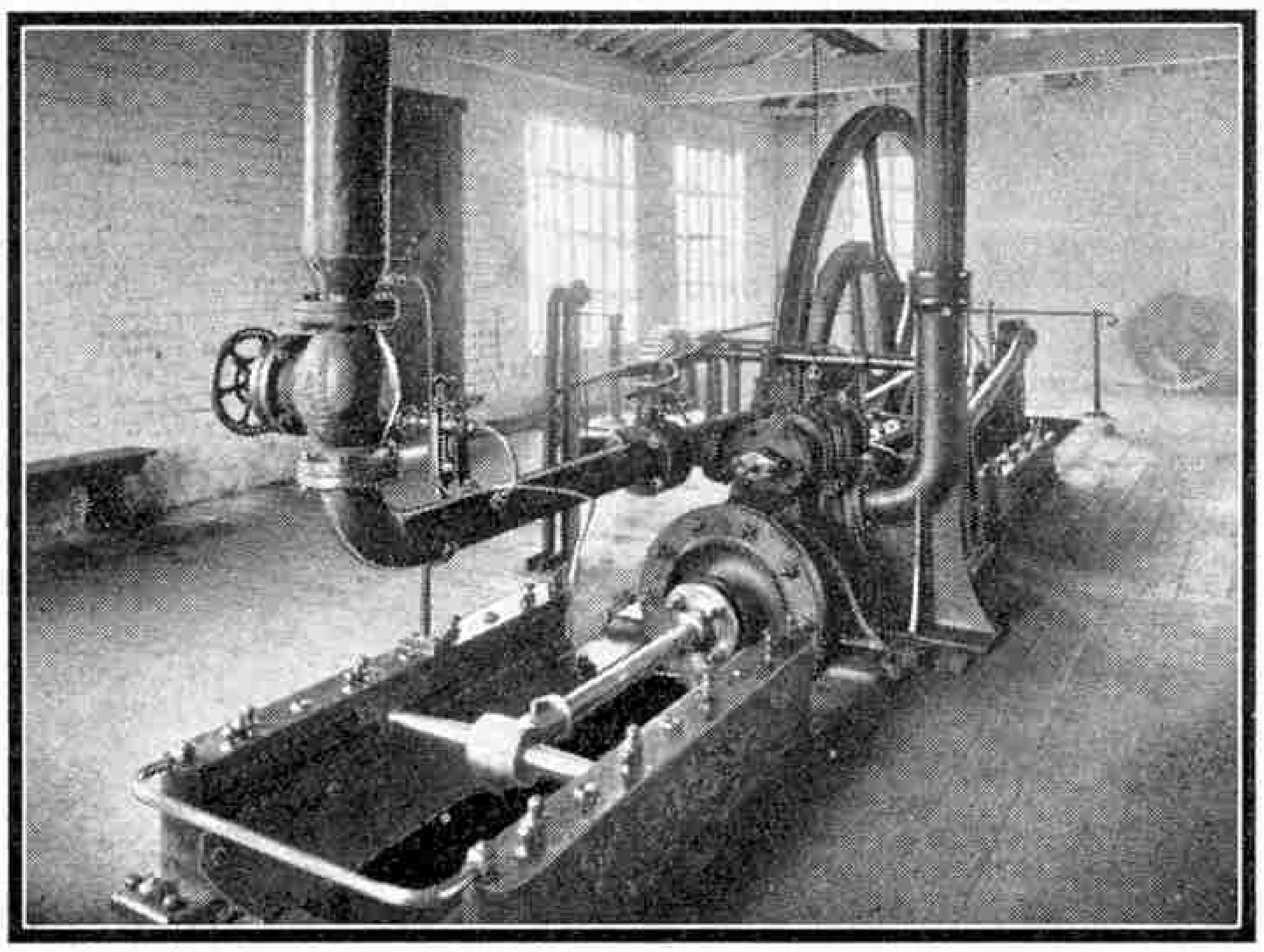
A luxurious four-engined "flying yacht" that will probably be the largest privately-owned aeroplane in the world has been ordered from the Boeing Aircraft Company, of Seattle, U.S.A., by Captain George Whittell, a wealthy Californian sportsman. It will be an all-metal monoplane with wings of 107 ft. span, and the beautifully streamlined fuselage will be 74 ft. long. In design it will be similar to the Boeing 307 four-engined air liners that the company are constructing for Trans-Continental and Western Air Inc. and Pan American Airways.

The "flying yacht" will have accommodation for 33 passengers, and the interior of the fuselage will be divided into suites to carry 13 in roomy luxury, with sleeping accommodation for seven. It will have a dining room and lounge, bedrooms for four guests, and a super suite with all the conveniences of home, including hot and cold running water and a shower bath. Four 1,100 h.p. Wright "Cyclone" engines will give the aeroplane a speed of 250 m.p.h.

Veteran L.M.S. Winding Engines

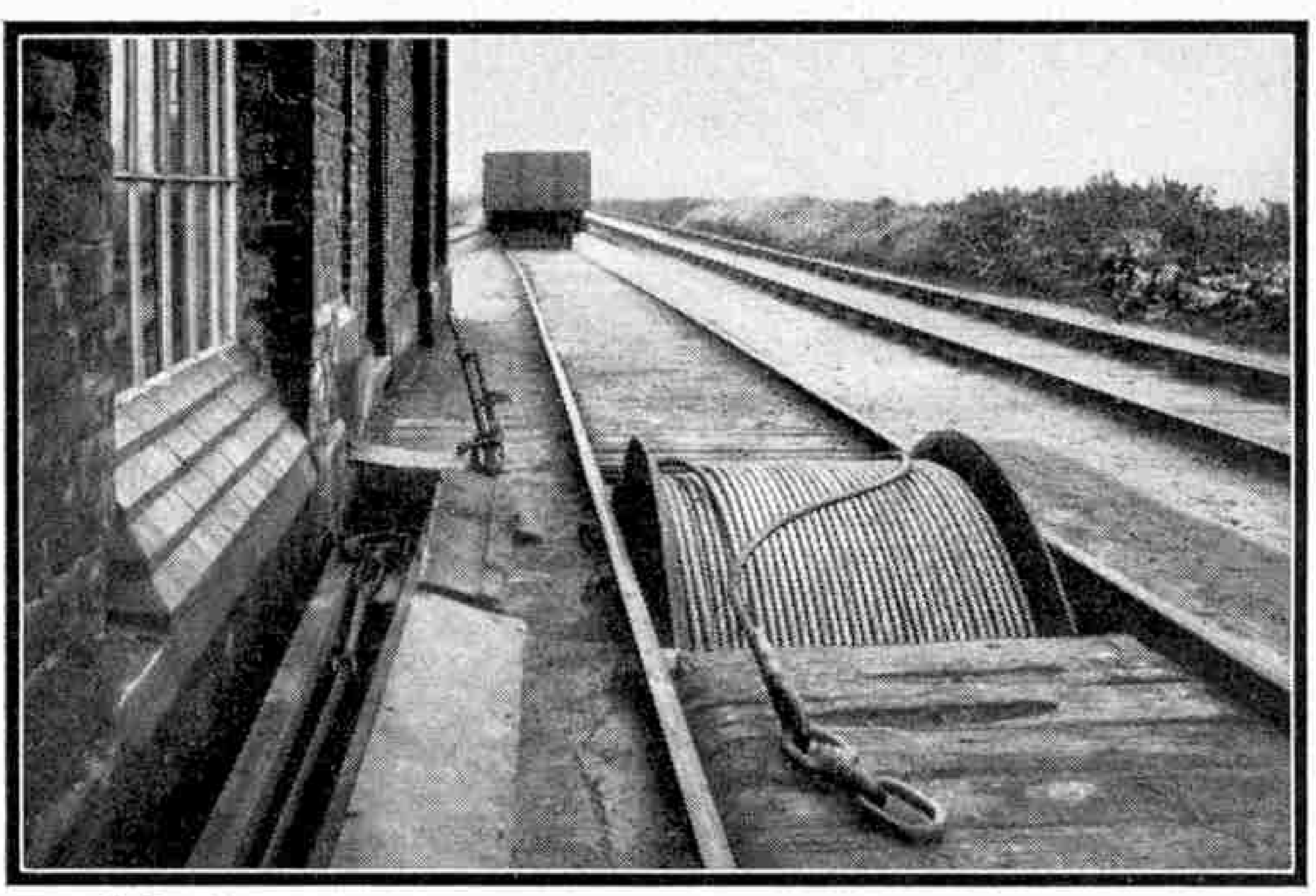
A Century of Continuous Service

HORSES were invariably employed for the haulage of the trucks on early colliery wagonways, which were used extensively in the north-eastern mining districts long before the development of railways as we know them. Many of these tracks were laid with gradients descending from the colliery to the point of shipment, so that gravity aided the progress of the loaded wagons down the incline. The empty wagons had to be hauled up the slope again by horses.



The winding engine at Swannington described in this article. This engine was installed in 1833 and has been in continuous use ever since.

Although the principle of employing the weight of descending wagons to draw up empties had been known for many years, and had been partially introduced at Whitehaven in 1725, it was not until 1798 that such a scheme was applied fully to the operation of a wagonway. This occurred at Benwell, Northumberland, where matters were so arranged that the loaded wagons descended the slope from the colliery to the staith by gravity, drawing up a weight of 16½ cwt. from a pit 144 yds. deep by means of a rope. This weight was sufficient to haul the wagons back up the gradient when they were empty, and in doing so it descended once more into the pit.



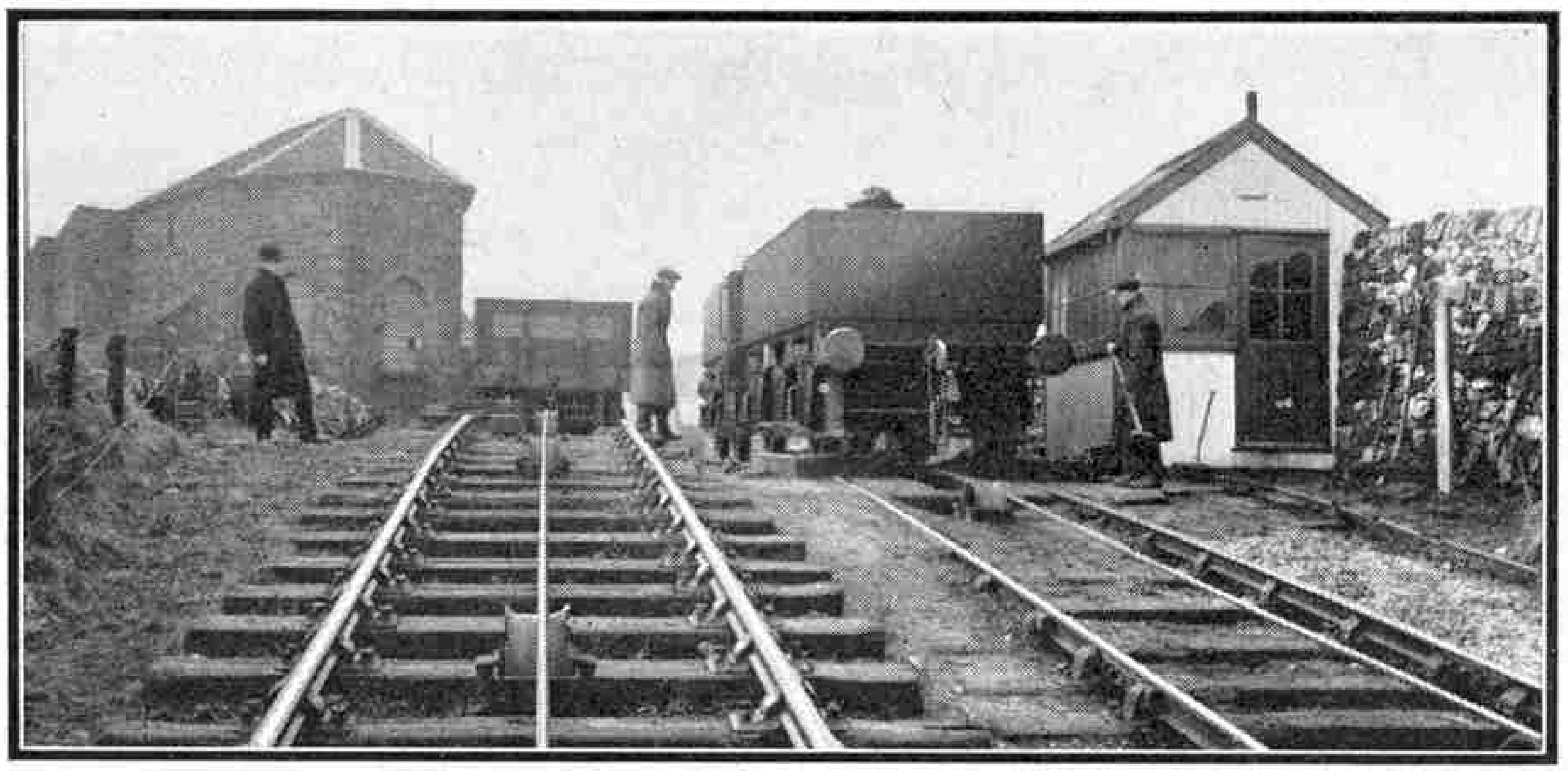
The winding drum at the top of the incline at Swannington. This photograph shows the coupling by means of which the wagons are attached to the cable.

Later loaded wagons running down the incline were made to draw up the empties, and a notable example of this kind of working was in use on the Whitehouse Incline of what became the Pelaw Main Colliery. Power was required where the load had to be taken up an incline, however, and in 1808 the first steam winding engine was erected on Birtley Fell when a wagonway to the Tyne from Urpeth Colliery was laid. There was subsequently a considerable development of steam-operated cable system in the north-east.

By dividing a railway into several stages it was possible to work wagons over quite respectable distances by this method, which was very successful. It evidently impressed Rastrick and Walker, two engineers whom the directors of the Liverpool and Manchester Railway commissioned to enquire into the methods of traction possible on that pioneer line. Their report was in favour of stationary engines, but was not decisive and resulted in the Rainhill locomotive trials of 1829, which established firmly the position of the steam locomotive. When the Liverpool and Manchester Railway was extended from Edge Hill into Lime Street Station in Liverpool in 1836, however, trains were hauled by cable up the incline from the new station to Edge Hill. Similarly on the London and Birmingham Railway the steep 1 in 70 incline from Euston up to Camden was worked by stationary winding engines for some years.

Although cable traction has long since given place to locomotive work on the Camden and Edge Hill inclines, it is still in use on certain sections of L.M.S. goods or mineral lines which are too steep for locomotive working. The winding engines on two of these inclines have performed a total of 218 years of continuous service and are still in regular use. One of these veterans is installed at Middleton Top, in Derbyshire, and the other at Swannington, Leicestershire, and for the following information concerning them and for the photographs to this article we are indebted to Mr. W. A. Stanier, Chief Mechanical Engineer of the L.M.S.

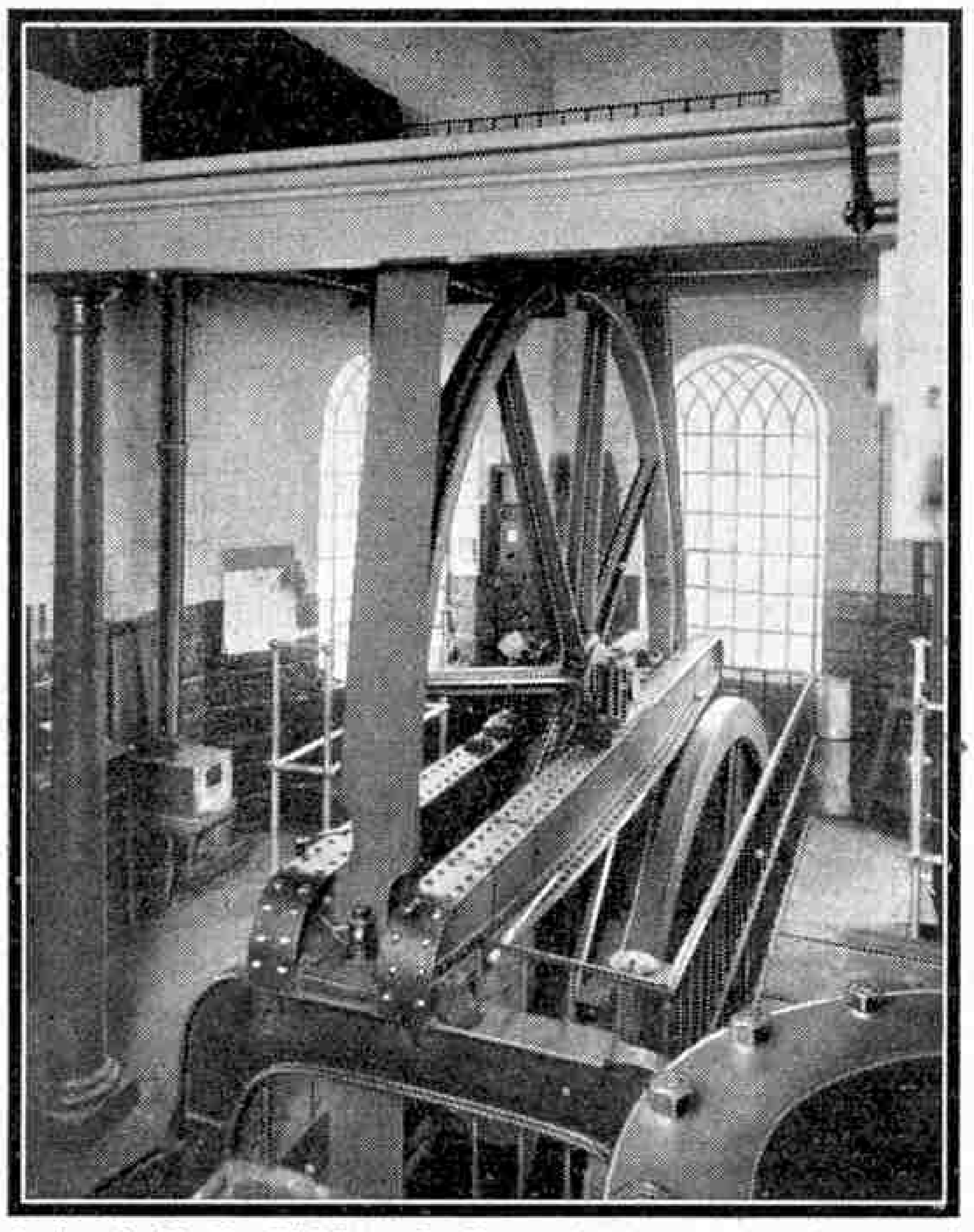
The Middleton Incline engine is the sole survivor of eight winding engines installed between the years 1825 and 1829 to work traffic on inclines that formed sections of the Cromford and High Peak Railway. The purpose of this line was to form a connecting link between the Cromford Canal in Derbyshire and the Peak Forest Canal at Whaley Bridge, and thus to join the canal system of the East Midland counties with that giving access to Manchester and Liverpool. As its name suggests, it was built through hilly country. Four cable-operated inclines were necessary, and that at Middleton is 1,100 yds. long, with a ruling gradient of 1 in 8, and has a double track.



Near the top of the 1 in 8 Middleton Incline on the Cromford and High Peak line. The pulleys for guiding the cables are prominent between the running rails.

The Middleton engine was built in 1825 by the Butterley Iron Works Company, of Alfreton, and remains substantially the same as when installed, with the original feed pump, integral with the engine, that supplies water to the two boilers. It is a twin-cylinder beam engine of the low pressure condensing type. The valves are operated by parallel motion, the system which was in vogue at the time for this type of engine, and the cylinders have a diameter of 2 ft. 1 in. and a stroke of 5 ft. The working pressure is only 5 lb. per sq. in. The boilers now in use are of the Lancashire type and of more recent construction than the engine.

The drive is transmitted through single-reduction spur gearing, a pinion on the crankshaft engaging with a spur wheel below it and giving a ratio of 2.75 to 1. The spur wheel is attached to a wire rope pulley having a diameter of 14 ft. 1 in. This pulley has two grooves, and the incoming rope from the incline is guided by a similar pulley placed vertically above it.



A view inside the Middleton Incline engine house, showing part of the veteran beam engine that has been at work for over a century.

The Swannington engine was installed for the Leicester and Swannington Railway, the oldest constituent part of the former Midland Railway system. This line was promoted in order to provide cheap transport into Leicester for coal mined in the Leicestershire pits. On it two inclines were necessary, one at Bagworth that was of the self-acting kind, and the other at Swannington, which was worked by the winding engine we are dealing with. The total length of the line was 16 miles, and it was opened to the bottom of the Bagworth incline on 17th July 1832. The rest of the line to Swannington was opened towards the end of 1833.

The original minute books of the Leicester and Swannington Railway Directors have been examined at Euston, and it has been ascertained that on 2nd April 1833 "Tenders for furnishing a stationary engine for the inclined plane (about half a mile long with a gradient of 1 in 17) at Swannington were opened—and it was resolved that the tender of the Horsley (Coal and Iron) Company (of West Bromwich, Birmingham), be accepted and an order given." On 12th August 1833 it was reported that the "engine at Swannington will be completed within three weeks."

This engine, which to-day is one of the treasured historical possessions of the L.M.S. Railway, has thus been running well over a century. Although there seems to have been some little trouble in its very early life it can undoubtedly be said to have given satisfactory service. The Directors' Minutes show that considerable difficulties were experienced with the various locomotives in the early days of the railway. The periodical reports nearly always state that the "Swannington engine is in every respect good," however, although soon after starting the shaft broke, and according to a statement made on 2nd August 1839 a new boiler had to be provided.

Originally the engine hauled up coal from the pit at the bottom of the incline, and presumably also that delivered by the old railways from farther afield, at Coleorton and Lount. Now its only duty is to let down the coal required by the pumping plant at the bottom, and to draw up the empties. This it does by means of a wire rope attached to a large drum driven by the original winding engine. The rope is attached to the coupling of the leading wagon by a slip coupling, which is disengaged when the top is reached, the wagons running forward.

The engine is of the long-stroke single-cylinder simple expansion type, with a cylinder of 18¼ in. diameter and a piston stroke of 3 ft. 6 in. It drives a square shaft to which is fixed the winding drum and the necessary brake for lowering. The valve and valve gear are of outstanding interest. They are of the "gab" type, in which the valve is operated by hand until the engine is running satisfactorily, when the slot at the loose end of the eccentric rod is dropped over the pin on the valve rod, and steam is admitted and exhausted from the cylinder in the usual way. The steam pressure is 80 lb. per sq. in., the boiler being a comparatively modern one. A small but interesting "steeple" engine of 1859, made by Carrett Marshall and Company, of Leeds, is used to work the pump for supplying the boiler.

It is possibly to the valve itself that most attention has been paid. The piston type is best for a valve that is to be operated by hand in starting up, for with it there is considerably less friction than with a slide valve. The Swannington engine's piston valve has been steadily at work for over a century.

The engine can haul six empty wagons up the incline, but the normal load is four, a weight of approximately 27 tons. It runs at a speed of 80 r.p.m. giving a ground speed of 9 m.p.h. so that it takes 3 min. to haul the load over the 37 chains to the top.

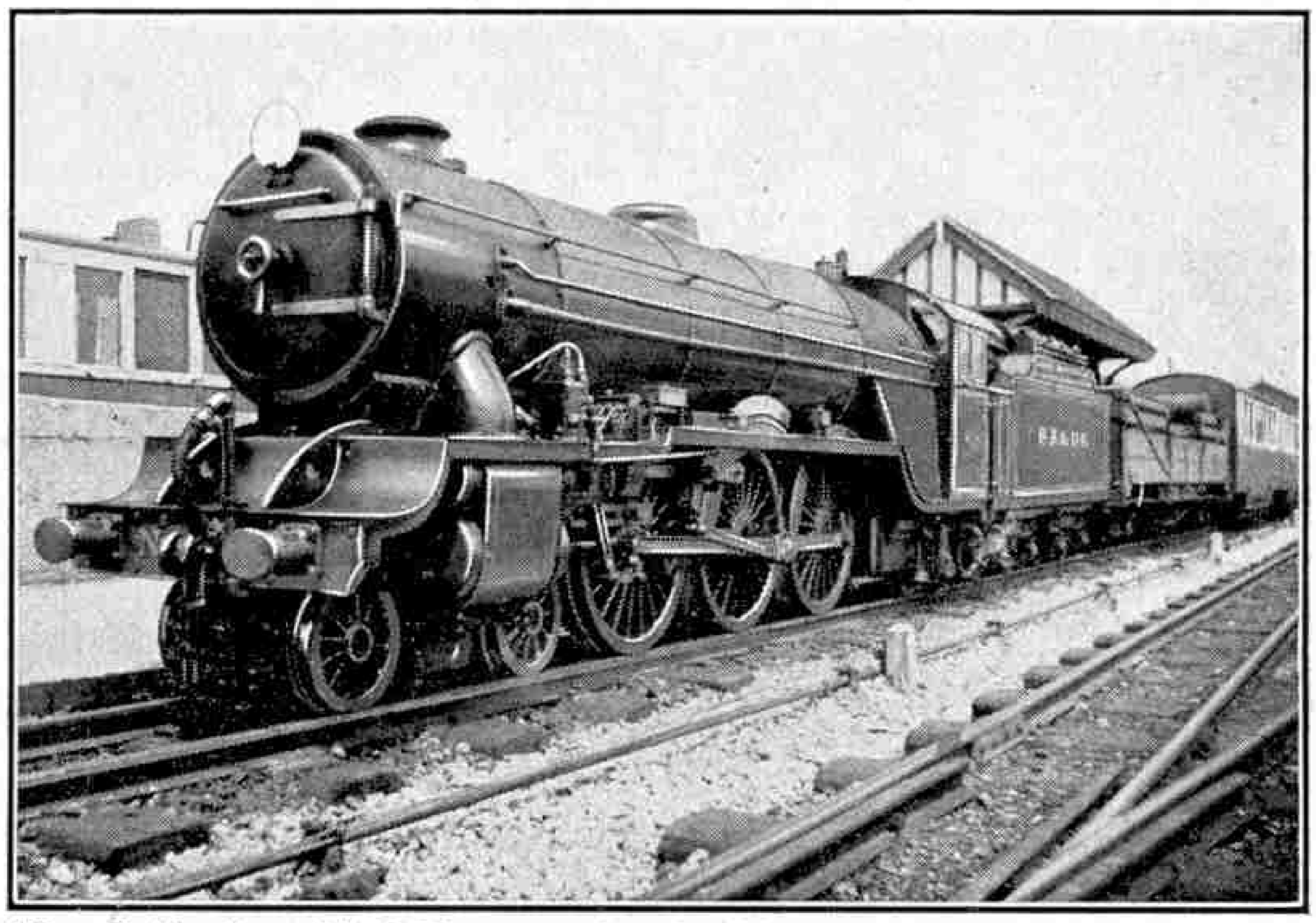
A Famous Light Railway

The Romney, Hythe and Dymchurch Line

By a Railway Engineer

SINCE its opening some eleven years ago the Romney, Hythe and Dymchurch Light Railway has achieved immense popularity. It can well claim to be the busiest 15-inch gauge line yet built, and unlike the miniature railways at Margate, Blackpool, and other holiday resorts, its traffic is far removed from that of pure joy-riding. All the year round the line provides a useful and well-patronised regular service between Romney, Littlestone, Dymchurch, and Hythe. During the summer the southward extension provides a direct route for the holiday-makers of Folkestone, Sandgate, and Hythe to the appealing shingly outpost of Dungeness, by which great liners pass very close, and whence pilots may be seen going aboard vessels for the London docks.

Some idea of the pressure of traffic in the little railway can be gained from the fact that up to 8,000 passengers have been carried in one summer day; and yet all this bustle, far from destroying the subtle fascination that surrounds any miniature railway, has changed the whole atmosphere of the line from that of a novelty into a deeply impressive example of modern transportation. Novelty created traffic in the first place, but now it is being sustained and increased by fast, reliable, all-the-year-round service, and most comfortable carriages. On a recent visit I was privileged, by the kindness of Capt. J. E. P. Howey, Deputy Chairman of the company, to see over the workshops at Littlestone, inspect a number of the locomotives in the running sheds and, most interesting of all, to ride on the footplate and observe at first hand the strenuous locomotive work required with the heaviest trains.



"Green Goddess," one of the 4-6-2 express engines of the 15 in. gauge Romney, Hythe and Dymchurch Railway. The resemblance to the full-size Gresley "Pacifics" of the L.N.E.R. is a striking feature.

The ordinary timetable is lavish enough, but in "*Bradshaw*" and on all the time bills the company undertake to run special trains at any time for parties of six or more passengers! During the summer months there are many who take advantage of this sporting offer, and then the locomotive department is taxed to the utmost.

Experience in dealing with such rush periods has necessitated rapid methods in carrying out running shed routine, and the most careful maintenance is given to keep every engine fully up to its job. In the case of certain locomotives a certain amount of rebuilding has been carried out in order to speed up and simplify maintenance. Although these engines run on 15 in. gauge track, that is just one-quarter of the British standard of 4 ft. 8½ in., they are roughly one-third of full size as far as the boilers, wheels, and cylinders are concerned; it is as though an L.N.E.R. "Pacific" were modified to run on the 3 ft. 6 in. gauge standard in South Africa.

Originally there were four different types of locomotive at work. Of the five "Pacific" engines, modelled on Sir Nigel Gresley's famous "*Flying Scotsman*" type, two were fitted with three cylinders. These two locomotives, No. 5 "*Hurricane*," and No. 6 "*Typhoon*," have now been converted to two-cylinder propulsion, thus making them identical with No. 1 "*Green Goddess*," No. 2 "*Northern Chief*," and No. 3 "*Southern Maid*." Then there are the two very powerful 4-8-2 mixed traffic engines, No. 7 "*Samson*" and No. 8 "*Hercules*," and the stock is completed by the remarkable Canadian Pacific 4-6-2s "*Doctor Syn*" and "*Black Prince*." All these engines are marvels of realism, but some of the details originally incorporated have needed alteration in the light of the intensive experience obtained. The substitution of laminated springs for the original coiled springs has greatly improved the riding of the engines at speed, while to facilitate quicker and more thorough cleaning of the tubes the superheaters have been removed. Simpler maintenance was a more important consideration than a slight economy of fuel.

The two Canadian Pacific type locomotives were built by the Yorkshire Engine Co. Ltd., but all the others were constructed by the Colchester firm of Davey Paxman and Co. Ltd. All repairs, up to and including complete overhaul, are carried out in the company's own shops at Littlestone-on-Sea, which are very completely equipped with machine tools, and all the necessary tackle for heavy lifting. An important consideration on a railway of this kind is the class of fuel used, for one coal, though an excellent steam-raiser, may give off too much black smoke. By a lucky chance Kentish coal, and particularly that mined at Betteshanger, near Deal, has proved the most suitable of all, yet this was scarcely realised until circumstances compelled a temporary change to coal from other sources.

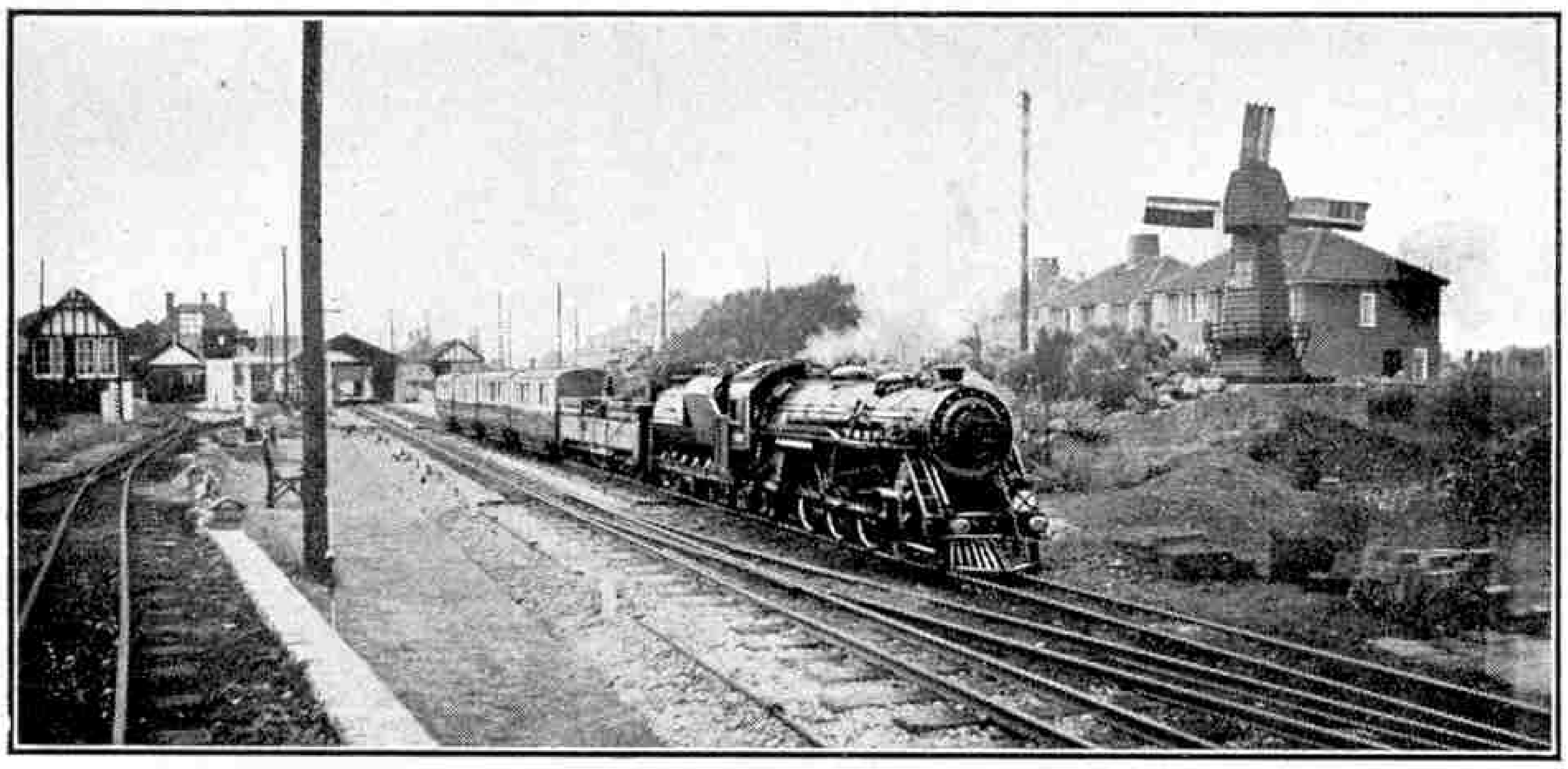
A little band of retired main line enginemen form the nucleus of the Littlestone driving link, but at most times of the year experienced amateurs are to be found taking their turns in the working of the ordinary service. Capt. Howey himself used regularly to take the road with the three-cylinder "Pacific" engine "*Hurricane*"; on a sunset excursion from Hythe to Dungeness the driver might well be a London business man enjoying a little week-end recreation, and this most unorthodox "link" includes at least one lady driver!

On my last visit to the railway I rode on the footplate of engine No. 1 "*Green Goddess*," with Driver Barnes, an ex-Southern Railway man. There is just enough room in the cab for two persons to sit side by side, and still allow of comfortable access to the coal bunker. Actually one sits at a level corresponding to that of the floor boards in a full-sized engine cab, with feet in well below the fire door. The cab layout is extraordinarily realistic. The engines are arranged for left-hand drive, but as the space between the fire-box and the side sheets is not big enough to accommodate both the brake and the reversing gear, the latter as the less important control is fixed on the right-hand side, where it is still within quite easy reach. The equipment includes such a refinement as a steam chest pressure gauge, a feature that in this country is still confined to L.N.E.R. locomotives.

The 12.50 p.m. from Hythe, by which I travelled, was made up to the maximum load permitted to the L.N.E.R. type engines, nine bogie coaches. These beautifully-appointed vehicles are completely closed in, though in fine weather, with all the windows open, they are delightfully airy. They seat eight passengers, and a fairly full train on my trip made a load of approximately 34 tons behind the tender. Hythe station is very prettily situated alongside the Royal Military Canal, and for the first half mile or so the railway runs on the south bank of the waterway. As we got away the sense of realism developed to an extraordinary degree. The footplate seats are so arranged that one looks out through the cab glasses, not over the roof; and really it needed only a slight closing of the eyes to imagine I was looking out from a full-sized L.N.E.R. "Pacific" engine. All the incidentals of footplate riding, the racket, the bumping, and the smells, were faithfully reproduced, but most striking of all was the perfect illusion of high speed. It is probably caused by being so close to the ground.

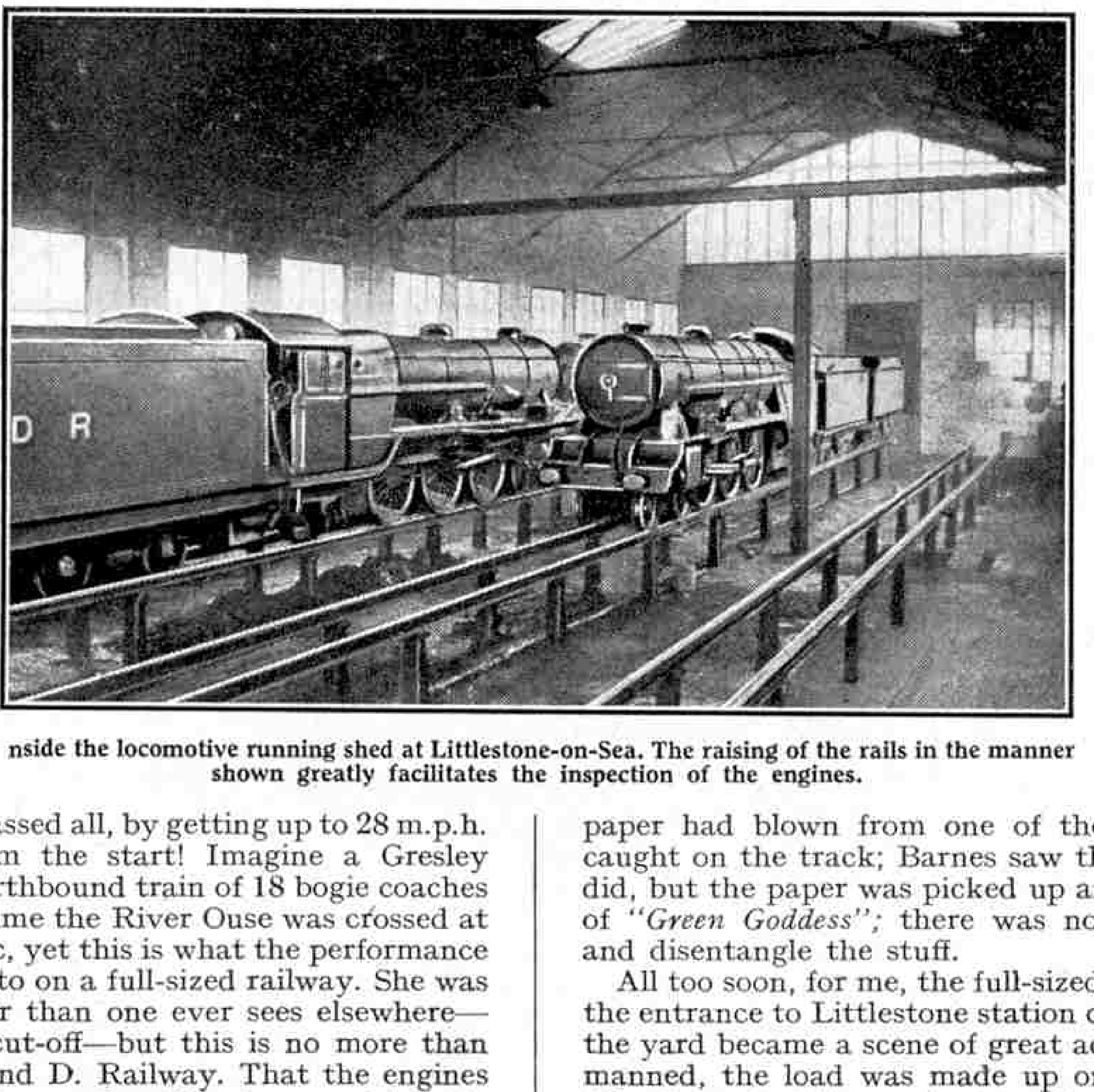
By this time we were out on to the wide expanse of Romney

Marsh, and with a strong west wind cutting right across the track Driver Barnes had *"Green Goddess"* going something akin to flat-out, and small wonder either! Our load was over four times the weight of the engine and tender, and this, in the case of a full-size train, would mean 620 or 630 tons behind the tender—a most exceptional tonnage. But *"Green Goddess"* was racing along as though she had a moderately-weighted streamlined train behind her. It is true that speeds of 20, 22, or 23 m.p.h. do not look very wonderful on paper, but to appreciate their full significance they must be converted to a scale speed. The fairest basis of comparison seems to be the revolutions per minute of the coupled wheels. At 19 m.p.h. the 25½ in. diameter driving wheels are revolving at exactly the same speed as the 6 ft. 8 in. diameter wheels of *"Flying Scotsman"* when doing 60 m.p.h., so that 19 m.p.h. can be considered the scale equivalent, on the Romney line, of a mile a minute on a full size railway.



A good idea of the picturesque situation of the station at Littlestone-on-Sea is given in this illustration. The train approaching is headed by one of the Canadian Pacific type 4-6-2s of the Romney, Hythe and Dymchurch Railway.

"Green Goddess" was being put through her paces with a vigour rarely seen on full-sized locomotives. When working up to speed Barnes used absolutely full regulator and 55 per cent. cut-off, and it was only when we had got to a scale speed of 70 m.p.h. or over that the regulator was partly closed. Even so the noise of the beat was tremendous for so small an engine. A very sharp look out is necessary, for although the line is fenced lambs often stray on to the track. A blast on the whistle is usually enough to make them jump back through the fences, but just as we were going at a thrilling 25 m.p.h. one such pair elected to race headlong down the line in front of us, and we had to slow down to walking pace. I was very impressed with the power of the brakes thus revealed by this "emergency" slack. All the R.H. and D. stock is fitted with the automatic vacuum brake, and the engine equipment includes a "half-size" combination ejector that was specially designed by the Vacuum Brake Company for use on this railway.



nside the locomotive running shed at Littlestone-on-Sea. The raising of the rails in the manner shown greatly facilitates the inspection of the engines.

From this check *"Green Goddess"* recovered to a really brilliant burst of speed, all on a perfectly level track, and when steam was shut off for the stop at Burmarsh Road we were doing 27½ m.p.h., equivalent to a scale speed of 86 m.p.h. The next stage illustrates the remarkably smart accelerations customary, for the stretch from Burmarsh Road to Dymchurch, a distance of 1⅛ miles, was actually run in 3 min. 55 sec. start-to-stop, a time that would not be considered ultra-slow with a full-sized steam train. But in starting away from Dymchurch the engine surpassed all, by getting up to 28 m.p.h. in less than three minutes from the start! Imagine a Gresley "Pacific" leaving York with a northbound train of 18 bogie coaches and attaining 88 m.p.h., by the time the River Ouse was crossed at Skelton Bridge! It seems fantastic, yet this is what the performance of *"Green Goddess"* is equivalent to on a full-sized railway. She was of course driven infinitely harder than one ever sees elsewhere—full regulator and 60 per cent. cut-off—but this is no more than ordinary working on the R.H. and D. Railway. That the engines stand up to such tremendously vigorous handling is a grand tribute to the way in which they were built and are maintained.

After this rousing effort there came the usual slack to walking pace over the level crossing at the Duke of York's Holiday Camp, but Driver Barnes did not press the engine to quite the same extent afterwards; we were on time and our acceleration to a steady 23¾ m.p.h. across the final length of the Romney Marsh was more gradual. Nevertheless a shade under 11 minutes for the 3¼ mile run from Dymchurch saw us into Littlestone-on-Sea, the headquarters of the line. Here the station, running shed, and workshops are set amid the loveliest of gardens, and to many summer visitors the flowers, rockeries, and a miniature windmill are almost as great an attraction as the locomotives. As we ran by there was a glimpse of one of the big Canadian engines inside the shed, while No. 3, *"Southern Maid,"* was outside, being got ready for the road. Except in the height of the summer, traffic out to Dungeness is not very heavy, and we continued with only two coaches; but the line itself becomes more fascinating than ever.

All the way from Hythe the sea is never far away, but after passing Greatstone the little railway comes practically on to the shore. By this time the great Dungeness lighthouse was a prominent object ahead. We set down passengers at The Pilot halt, so named from a lonely inn near by, and shortly afterwards the up and down tracks parted company. The southern extremity of the line consists of a big loop. There is no terminus in the ordinary sense of the word; down trains arriving at Dungeness from Littlestone, or Hythe, just continue round the loop without any shunting or removal of the engine, and after some distance the track swings alongside the southbound line, which had been traversed a short time previously. Such a layout would scarcely be possible but for the limitless space available on this flat windy promontory, but it certainly makes things very simple from the operating point of view. It is 14 miles in all from Hythe to Dungeness, and the journey takes just an hour. In the ordinary way no very fast running is attempted south of Littlestone, and for the 5 miles out to Dungeness the schedule is exactly the same as for the 8¾ miles from Hythe to Littlestone—half an hour.

But the most absorbing experience of my visit was reserved till the end; for now, from The Pilot northward, I was permitted to drive *"Green Goddess,"* with Driver Barnes acting as pilotman of course. In all footplate experience there is no thrill to compare with an engine's first movement under one's own control, and very soon I was oblivious to everything save the rhythm of motion, the gauges and controls, and the road ahead. While I was driving there occurred a curious incident that shows how very different conditions are on a miniature railway. A large sheet of newspaper had blown from one of the neighbouring bungalows and caught on the track; Barnes saw this and advised slowing up. We did, but the paper was picked up and caught in the driving wheels of *"Green Goddess"*; there was nothing for it but to stop dead and disentangle the stuff.

All too soon, for me, the full-sized semaphore signal that controls the entrance to Littlestone station came in sight, and on our arrival the yard became a scene of great activity. *"Green Goddess"* was remanned, the load was made up once again to nine coaches, and *"Southern Maid"* came backing down with full steam up. A special was booked from Hythe that afternoon, and to save running light this second "Pacific" was being worked up as pilot to *"Green Goddess."* And so the little flyer went off, the embodiment of all the fascination and unique character of the line.

ENGINEERING NEWS

An Electrically-Controlled Door Engine for Passenger Vehicles

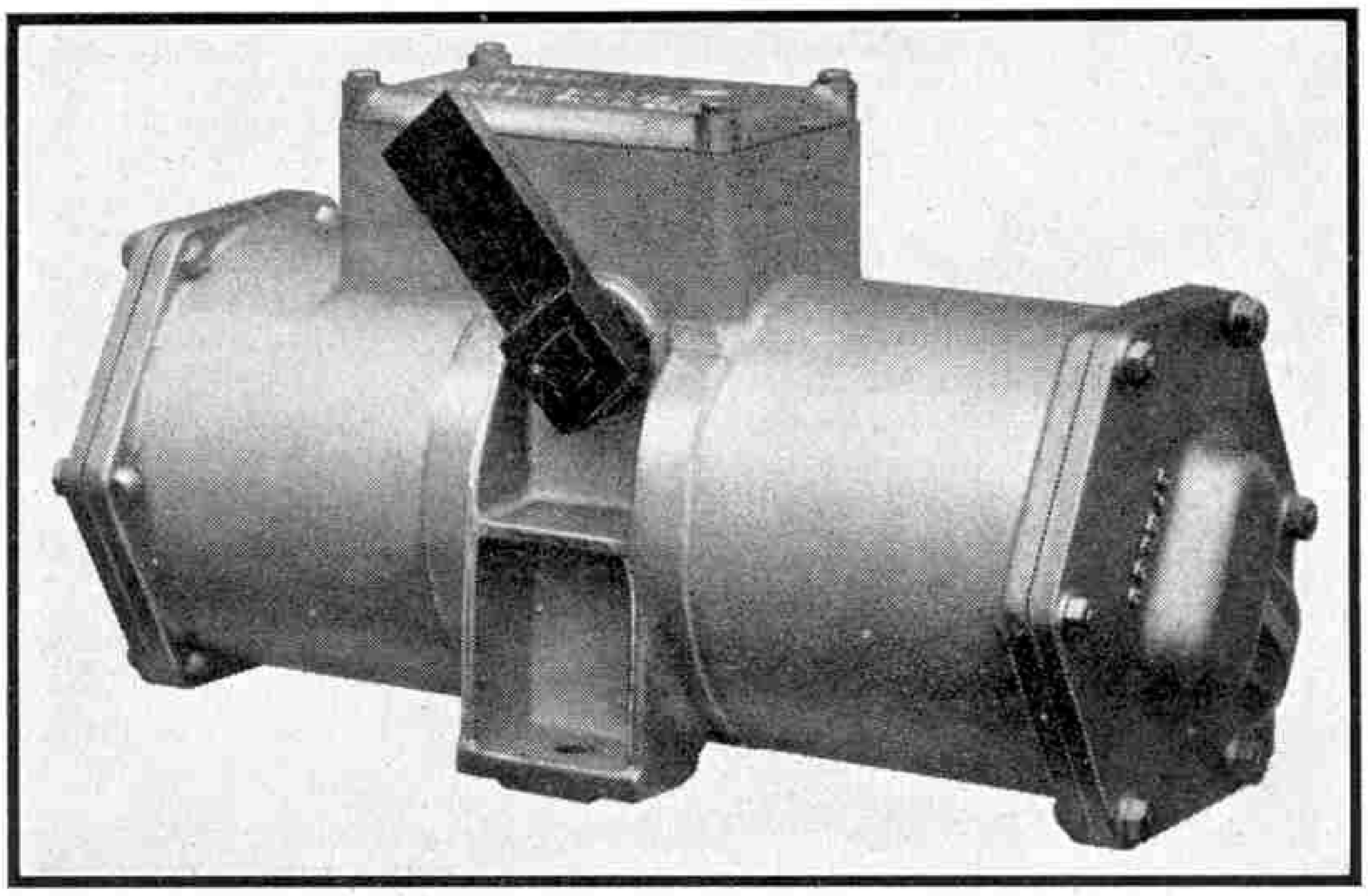
In passenger vehicles such as buses and coaches it is desirable that the opening and closing of the doors should be under the control of the driver or conductor. To meet this need the Westinghouse Brake and Signal Co. Ltd., London, has designed the electrically-controlled vacuum door engine shown in the illustration on this page. The engine is suitable for opening and closing doors of all types of vehicles.

The engine consists essentially of a light alloy casting, which forms two opposing cylinders. Pistons moving in these cylinders are connected by a rod that has teeth cut in it to form a rack. Engaging with this rack is a quadrant mounted on a shaft, which carries also a lever that actuates the doors. This lever is connected to the door by a slide, which engages with a vertical bar mounted on the door. When the pistons move the lever is turned, the action of the piston in one cylinder moving the lever in one direction and that of the other returning it.

The valve gear for reversing the door engine is embodied in it, and consists of a slide valve operated by two electric solenoids controlled by push button switches. Two or more switches placed near the conductor's platform and in the driver's cab can be used, so that the doors can be opened and closed either by the driver or by the conductor. There are two buttons on each switch, one for opening and the other for closing the door. To open the door, the appropriate button is pressed, so energising one of the solenoids on the door engine. This moves the slide valve over and connects the "opening" cylinder to the vacuum reservoir and the other to the atmosphere. To close the door the switch marked "close" is pressed. The "closing" solenoid then returns the slide valve, thus connecting the "closing" engine cylinder to the vacuum reservoir.

By the use of an additional single push button switch, the doors can be opened from the outside of the vehicle in cases of emergency. If necessary, the doors can also be moved by hand.

A low degree of vacuum, depending on the size and weight of the doors, is used for the operation of the equipment, and is provided usually by the vacuum brake equipment of the vehicle.



The Westinghouse electrically-controlled vacuum engine for opening and closing the doors of motor vehicles. Photograph by courtesy of the Westinghouse Brake and Signal Co. Ltd., London.

Engineering in Moscow

During the past 20 years, the population of Moscow has more than doubled. It is now around 4,000,000, and it is anticipated that this total will be raised to 5,000,000 in the near future. For several years therefore the city has been actively engaged in modernising its public transport facilities, and this work has necessitated the construction of many new roads, several bridges, and over 25 miles of underground railways.

One of the great new roads will extend completely through the city to the Palace of the Soviets, which is to be the world's largest structure. This building, which was described in *"Engineering News"* in the *"M.M."* for July, will contain 62 escalators and 99 elevators! Many of the existing streets in older parts of the city are being widened to 100 or 130 ft., and to as much as 230 ft. in the newer areas. Many new roads also are being built, and five fine new bridges across Moscow River are now in course of construction.

The underground railways are in tunnels driven at considerable distances below the streets, and the first section was opened for traffic in May, 1935. The first tunnels were excavated by ordinary mining methods and lined with concrete, but the newer ones are being driven with the aid of shields, and are lined with cast-iron segments. The tunnels have an internal width of 18 ft. Ventilating air is drawn in from outside, and is conditioned to maintain an equal temperature at all parts of the tunnels.

Huge Reinforced Concrete Tank

A particularly interesting example of the utility of modern concrete construction is a huge water storage tank, having a capacity of 1,500,000 galls., that has recently been completed at the Crown Willamette paper mills on the Columbia River, about 40 miles from Portland, in the United States. This mill is one of the largest pulp and paper producing plants in the north west, and the tank is used to store the filtered water required in the manufacturing processes.

The walls of the tank at the sides, are 24 ft. high, and it has an inside diameter of 106 ft. A total of 1,200 barrels of cement was used on the job.

The tank was constructed under the patented Hewitt system, the walls being built in vertical sections. First a concrete foundation ring and floor were poured. Then a movable form for the inside walls was built and mounted on rollers. Sectional forms for the exterior wall of the tank were then built up and placed in position by a travelling "A" frame, which ran on a track laid on the top of the movable form section. The inside movable form was pulled away from the wall by a chain block when the concrete had set in a completed section, and then rolled to the next position.

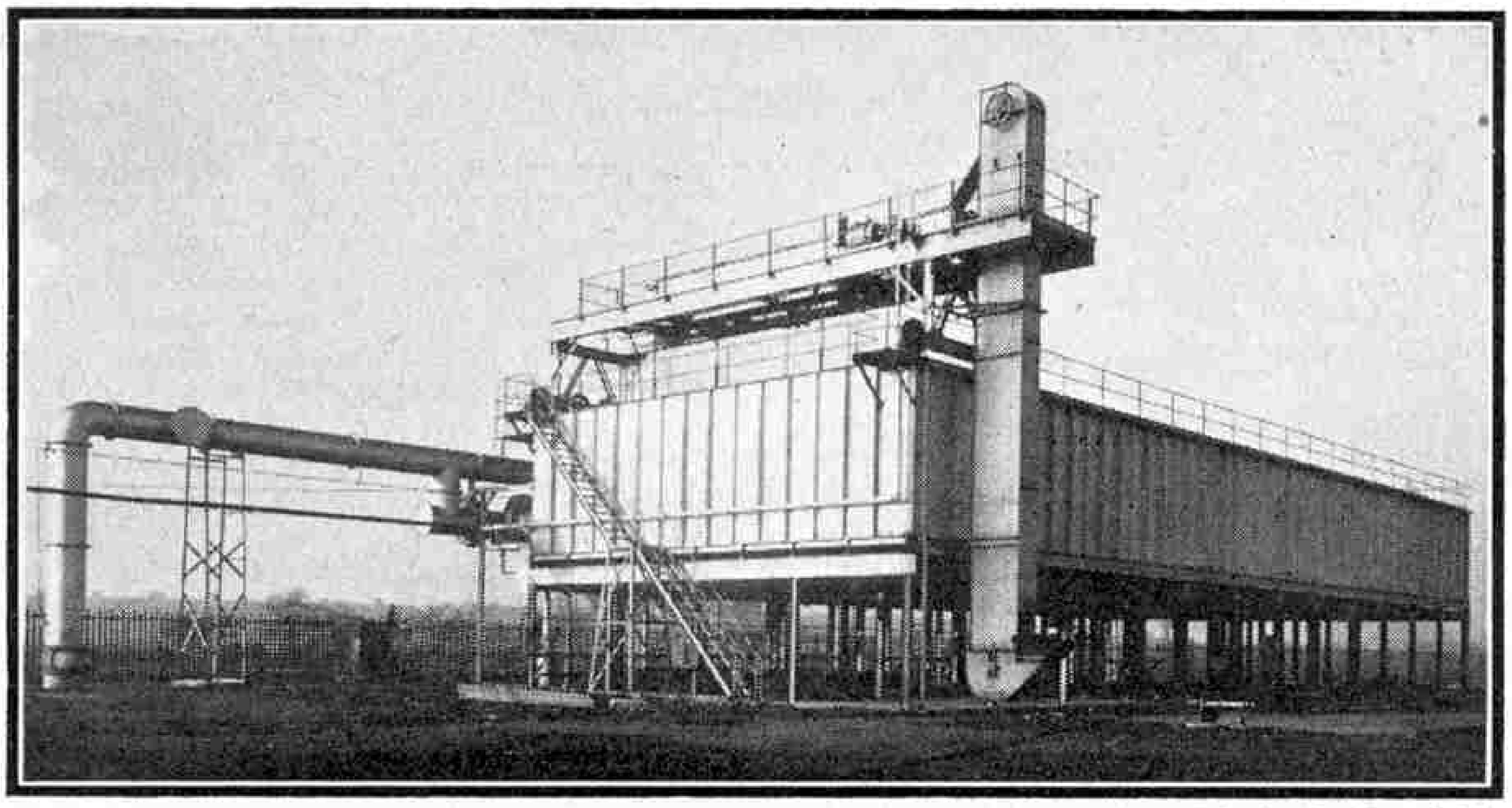
Accuracy in positioning the inside form was assured by bracing it to a king-pin in the centre of the tank, and by a guide line drawn on the tank floor. To allow the form to be withdrawn as each section was completed a movement of a few inches towards the centre of the tank was provided for by a slot in the bracing connecting the form to the king-pin.

A Giant Timber Floating Chute

A gigantic water chute, down which timber will be floated to the sea, is being constructed in Sweden. It will connect a river in the forest regions with the sea, and will be nearly 3 miles long. It comprises a canal 11,400 ft. in length and a conduit of reinforced concrete 3,900 ft. long. The conduit is being made up of sections, each about 21 ft. long and weighing 6 tons, which are manufactured by a special process in a plant built for the purpose. The making of the chute has necessitated the construction of 57 bridges and a railroad for transporting materials.

A Large Welded Gas Holder and Purifier Plant

Many structures that formerly were built by riveting are now being designed for assembly entirely by welding. Two good examples are the large spiral-guided gasholder and the Dry-seal purifier boxes shown in the illustrations on this page. These form part of the gas plant of the Stretford and District Gas Board, and were constructed recently by the Oxley Engineering Co. Ltd., Leeds.



Four electrically welded Dry-seal gas purifier boxes recently erected for the Stretford and District Gas Board. The photographs on this page are reproduced by courtesy of the Oxley Engineering Co. Ltd., Leeds.

The gasholder has a capacity of 2,000,000 cu. ft., and is the largest of its kind in Great Britain constructed entirely by welding. It has four lifts, each 31 ft. 8 in. in height. The diameter of the inner and smallest lift is 141 ft. 10 in., and that of the outer steel tank forming the base is 152 ft. 6 in. The approximate total weight of steelwork in the structure is 880 tons, and the plates vary in thickness from 31/32 in. to ⅜ in.

The gasholder is equipped with patent overflow and return ducts, which prevent all excess water from being discharged over the top of the dips, and is the first in which this system has been employed.

Before entering the gasholder the gas is passed through the purifying plant shown in the upper illustration. This consists of four large boxes containing the purifying materials and each measuring 40 ft. by 30 ft. by 12 ft. The boxes were constructed entirely by welding, and each is fitted with a special removable cover. A travelling gantry crane is provided for handling the covers, and for elevating and conveying the purifying materials from the ground to the boxes. The crane runs on rails along the sides of the boxes.

The bottom of each box is covered with a 2 in. layer of cement, while the walls and inner side of the cover are sprayed with a coating of asbestos compound.

Powerful Searchlight at Glasgow Exhibition

A two million candle-power searchlight that shines from the top of the Tower of Empire after dark, is the latest addition to the illuminations at the Empire Exhibition, Glasgow. The searchlight has given Scotland a new landmark, as the beam can be seen right across the country.

Until recently the searchlight was on show at the Services Pavilion in the Exhibition, and has now been loaned for the duration of the Exhibition by the Army authorities.

Printing a Million Newspapers an Hour

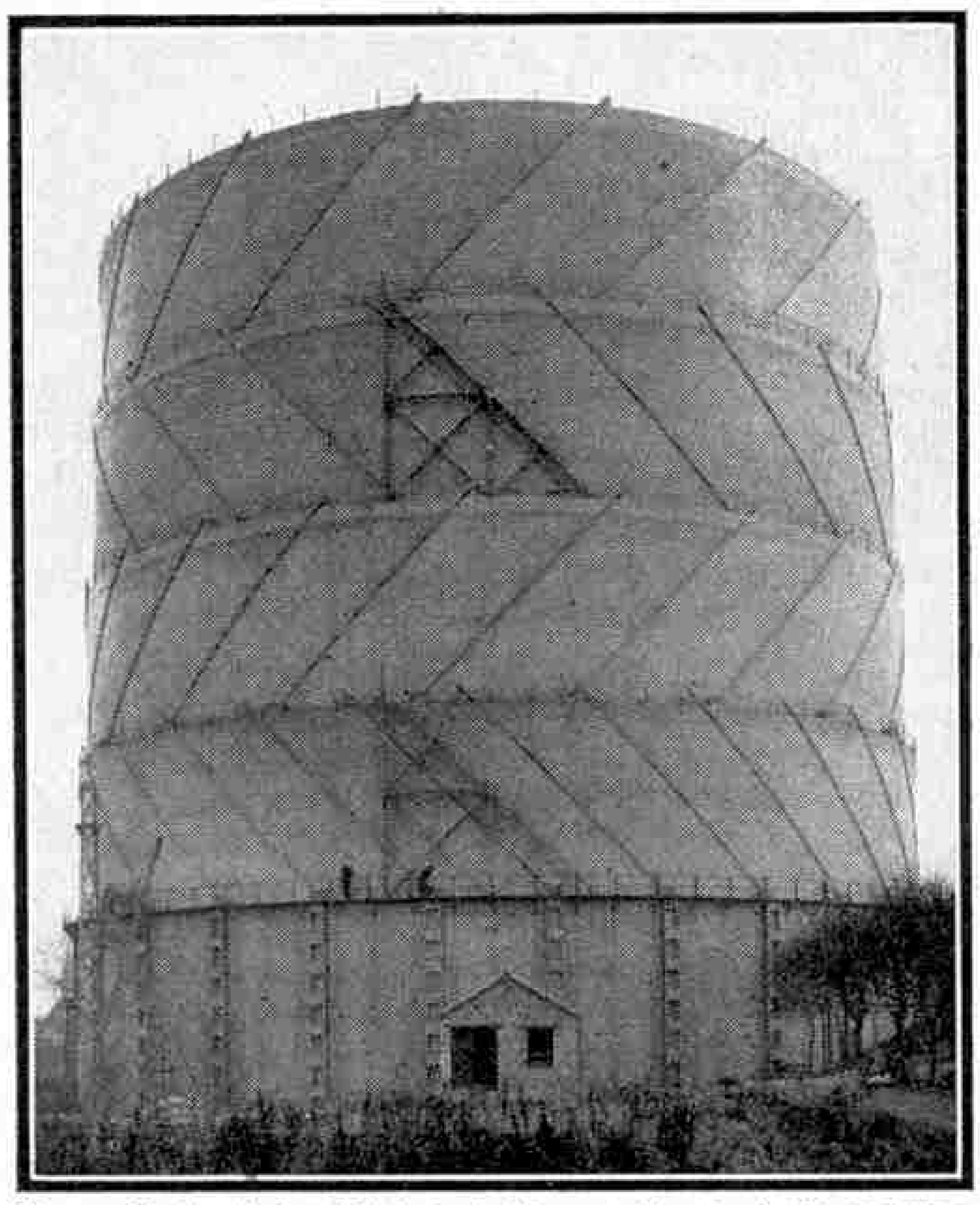
A huge rotary printing press, which will turn out a million copies of an eight-page Russian newspaper per hour, is being assembled at a printing machinery works at Rybinsk on the Volga. It weighs over 1,200 tons, has a length of 257 ft., and is 21½ ft. high, and is equipped with apparatus for printing in two colours. The machine will be used for printing the newspaper *"Isvestia."*

Wind Effect on a Great Bridge

During a recent gale, when the wind reached a velocity of 75 m.p.h., the centre of the great Golden Gate Bridge at San Francisco was deflected horizontally about 8 ft. The span is suspended by two cables 15 in. apart, and the vibration set up caused them to strike against each other, while a series of waves appeared to move rapidly across the roadway.

A Pipe Line Bridge

An interesting pipe bridge resembling a cross-country electrical power line was recently constructed by the El Paso Natural Gas Company, Arizona, to carry gas.



The welded spiral-guided gasholder at Stretford. It contains approximately 880 tons of steelwork.

The pipes are carried in saddles suspended by hawsers from two strong cables that swing between steel towers. Each tower is 85 ft. high and they are placed 1,000 ft. apart. The pipe itself was welded in sections, which were then fed out from opposing towers. The sections were then pulled together by cables, while men along the line steered the pipe in the saddles. After meeting in the centre the lengths were welded together at the joints.

Important Steel-Making Achievements

What is believed to be the heaviest steel casting ever made in Britain has just been completed at the English Steel Corporation's Grimesthorpe Foundry. It is a baseplate main girder for a large hydraulic press, and is 32 ft. long, 11 ft. 3 in. deep and 5 ft. 6 in. wide. Over 175 tons of steel were required to cast this mammoth piece, which has a finished weight of just over 120 tons.

In the *"Engineering News"* pages of the *"M.M."* for January last, we published details of the manufacture of a 230-ton ingot of steel, which was the largest ever cast in Great Britain. This exceptional feat was accomplished at the Vickers Works of the English Steel Corporation Ltd. at Sheffield. The ingot was of carbon steel, and further ingots of similar weight have since been cast in alloy steel.

The making of these huge ingots is now looked upon as a more or less routine job. Some of them are used for making large forgings, such as gear wheel rims, while from others columns for a 15,000-ton hydraulic press have been made. This press is one of the largest of its type yet constructed. The columns were forged under a 7,000-ton electro-hydraulic press at Vickers Works, and they measure 64 ft. long by 3 ft. 7 in. diameter, with a forged weight of 115 tons.

Power Station Under a Mountain

As a precaution against air raids from enemy bombers, a great electric power station now being constructed in northern Italy is being hidden under a mountain. The generating machinery will be housed in a huge chamber excavated in the solid rock, to make which over 55,000 cu. yds. of material have had to be removed. The new station will be the largest in Europe, and with thousands of feet of solid rock for a roof it will be safe from even the largest and most powerful bombs.

Tunnels to Connect Italy and Sicily

Plans have been prepared for the construction of two great tunnels under the Strait of Messina, to connect the island of Sicily with the mainland of Italy. The tunnels will be at a depth of nearly 200 ft. below sea level, and will be seven miles long. One of them will accommodate electric trains, while the other will be reserved for motor traffic and will be fully equipped with automatic signals. In order to avoid steep gradients the entrances to the tunnels will be placed well inland.

A Novel Exhibition Building

A great dome of stainless steel 66 ft. high and 132 ft. in diameter is being built to house the steel exhibit at the New York World's Fair next year. The dome will be supported by 10 steel trusses, mounted on a concrete foundation, and inside it will be two floors. Part of the second floor will be suspended from the trusses by cables.

Careers in Civil Aviation

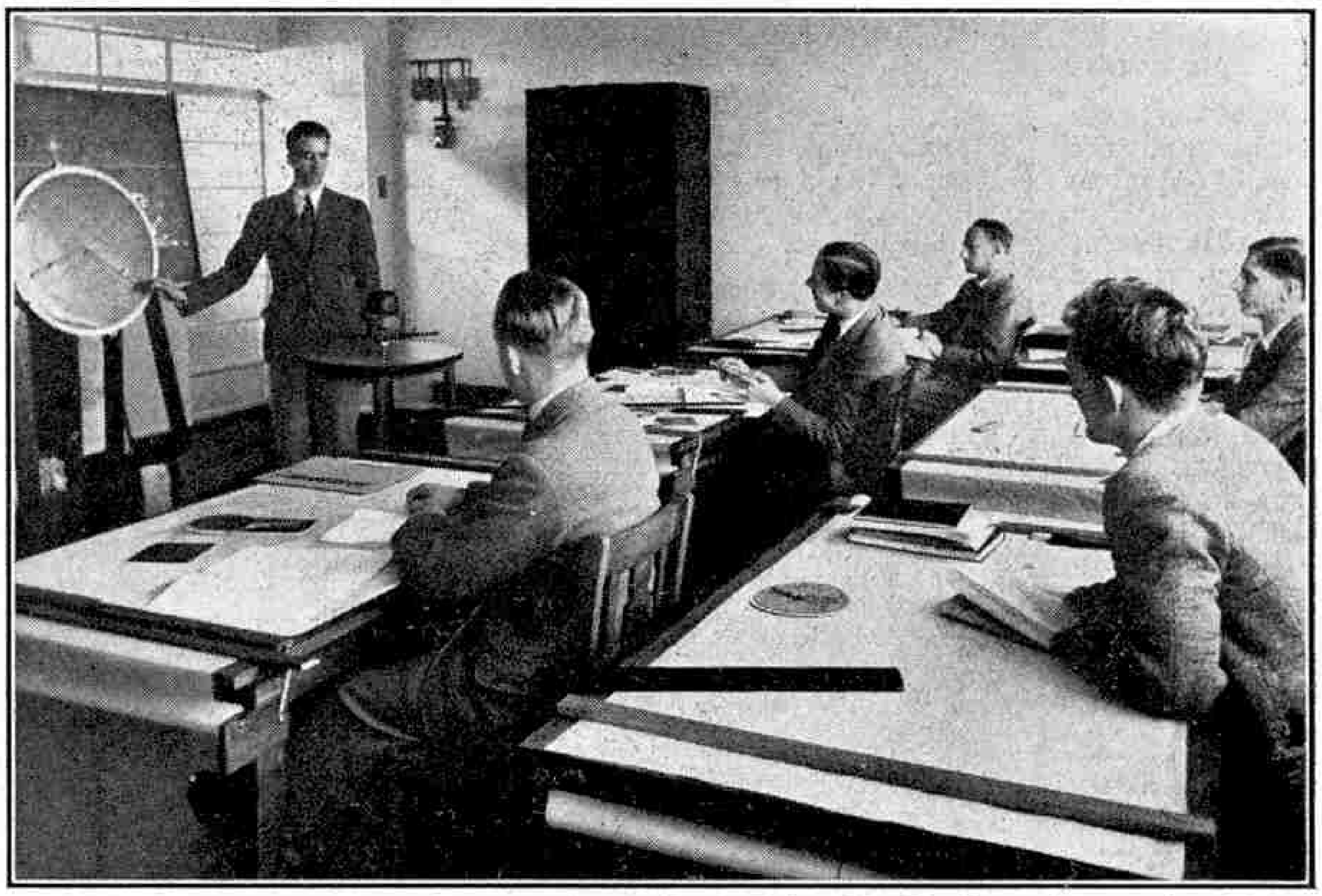
The Posts Available and How to Obtain Them

By Neil Ewart

As a profession, commercial aviation offers many excellent opportunities, and there must be many readers who have a strong desire to take an active part in this fascinating life, but are not acquainted with the numerous positions that are open, and how to enter them.

In order to produce a clear picture it will simplify matters if the various careers are divided into two separate classes, flying and non-flying. Before you can seek employment in either of these two branches of aviation it is essential that you should be armed with the necessary licences. If, for instance, you wish to become a commercial pilot, you must undertake a course of training for the commercial pilot's "B" licence. Unfortunately, the air line companies do not train prospective pilots for this, and so you have to pay for the training yourself. But quite naturally, if you are unable to fly, you must begin by doing this, and the first licence you should seek is termed the private pilot's "A" licence.

Most of the larger towns have their flying clubs where you can obtain instruction for this licence, and provided the weather conditions are good and you are able to put in a regular attendance you should qualify within a fortnight. The training costs anything from £12 to £25 and an average pupil has about eight hours of dual instruction before he is allowed to fly "solo." The tests for this licence are quite simple; they consist of a medical examination, oral questions on the rules of the air, and two short flying tests in which you are the sole occupant of the aeroplane. The only other requirement for this licence is that the applicant should have reached the age of 17 years.



Students receiving instruction in navigation at the Brooklands Flying Club. The illustrations to this article are reproduced by courtesy of "Flight."

The "A" licence only entitles you to fly for your own pleasure or business purposes, whereas the "B" licence is the one that permits you to fly for hire or reward. The training for the latter licence can be obtained at any of the leading flying clubs, and the course, which lasts from six to eight months, costs anything from £200 to £300. As it is necessary to have 100 hours solo flying experience for this licence, this item alone contributes largely to the apparently high fees. A certain amount of advanced dual instruction and cross-country flying experience; lectures on the aeroplane and its engine, meteorology and air navigation and air legislation account for the remainder of the cost.

The tests, which are conducted by the Air Ministry, include a thorough medical examination, technical examinations on the above-mentioned subjects, and a series of practical flying tests. Anyone between the ages of 19 and 45 years can apply for this licence, and when it has been secured it is valid for six months. It can be renewed on evidence of at least six hours flying during the preceding six months, together with medical re-examination.

All this may appear to be very difficult, but in reality it is comparatively simple, and when you have qualified for the licence you are free to undertake a host of commercial flying jobs. Of these, flying on an air line ranks foremost, and there are many vacancies in this respect. Naturally the type of job and the pay depend entirely on the amount of flying experience you have, and this is gauged by the number of hours you have flown. Normally, the pay ranges from about £300 to £1,200 a year.

An air pilot's career has many attractions. He enjoys a healthy and open air life, and he holds an unusually responsible position because, as is the case with the captain of a ship, all the passengers lives depend upon his personal skill and care. Normally an air line pilot has set hours of work, and at the end of a successful day's flying he experiences a very satisfying feeling as he considers the job that has been well done, having transported his passengers safely and on time.

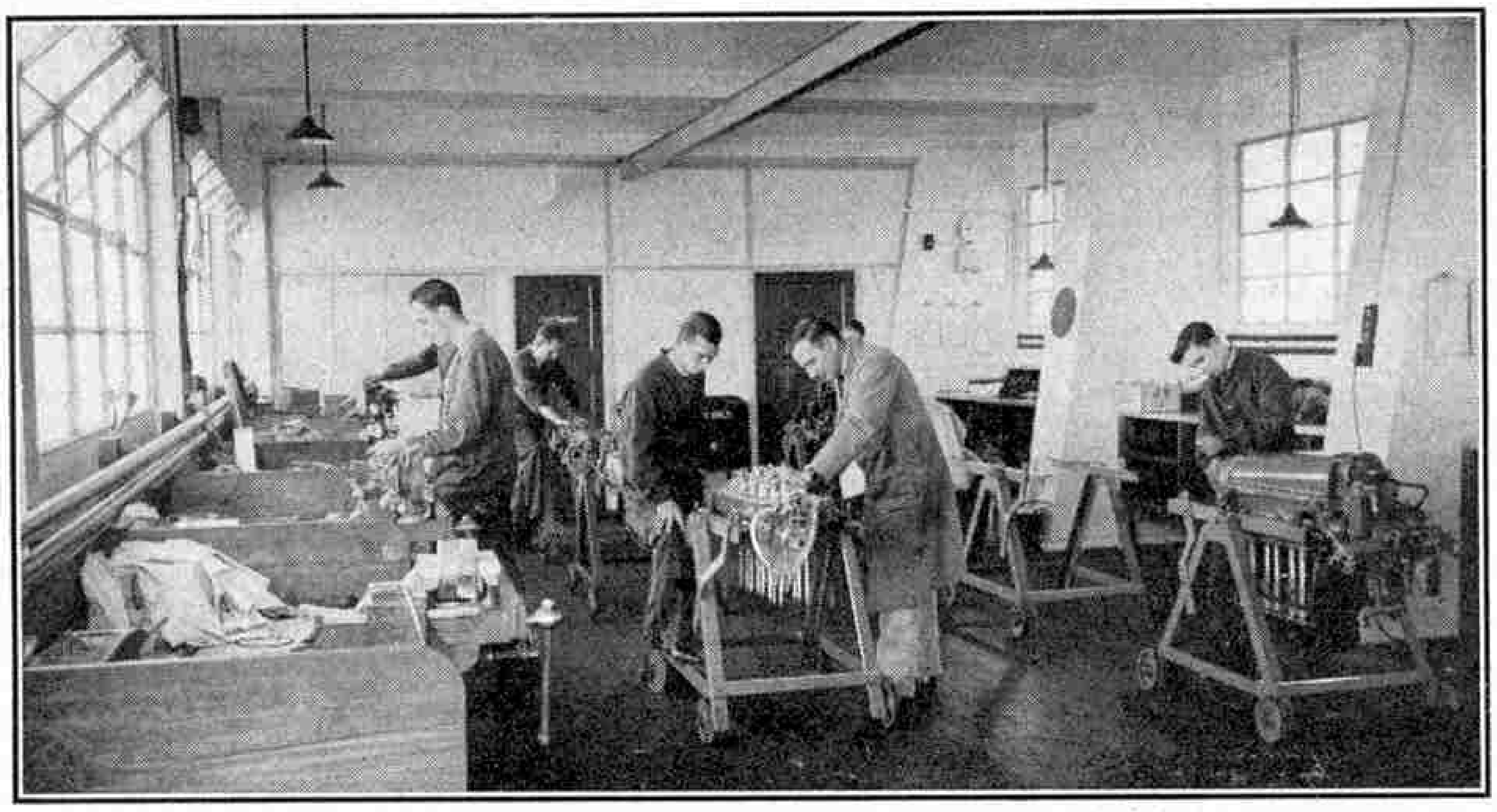
Another branch of commercial aviation is taxi flying. The taxi pilot must be ready to fly passengers anywhere and at any time, no matter how adverse the weather conditions, and he must do this with a minimum of delay. A pilot who has won a good reputation for this work receives excellent pay. He must be ready to leave at a moment's notice and fly people to any part of this country, and even abroad; and on many occasions he will have to make use of fields when no landing ground is available. Most of the work is done in flying newspaper photographers and reporters from place to place, and so quite naturally the ability to pierce bad weather and complete the job before the rival newspaper is of the utmost importance.

Then there are other flying jobs such as joy-riding and the towing of advertisement banners; and sometimes a man is fortunate enough to secure a position as private pilot to some business man. The pay attached to this last type of job is excellent as a rule, but unfortunately there is not a very strong demand for private pilots at the moment, although there can be little doubt that this field of commercial aviation will enlarge in the near future as more people purchase aeroplanes.

The ambition of many people is to become a test pilot, but this is not easy; only the very best pilots with a great deal of experience and tremendous flying skill are employed. The test pilot has to be able to advise his firm's design staff besides testing the machines, and this is the highest paid post in civil flying. Some firms pay a salary with additional fees for every new machine tested, while others pay the pilot a fixed salary. It is possible to earn £1,500 a year, but even this is certainly well earned, because there are few test pilots who have not been confronted with a sudden danger in mid-air when some fault in the machine has presented itself.

The job of flying instructor attracts many, but although you may be an excellent pilot you may not make a good instructor. A high degree of flying skill, patience, and the ability to impart your knowledge to the pupil are essential qualities that a good instructor must possess. It is an interesting life to which reasonably good pay is attached, and it has another advantage in that as a rule you only fly in favourable weather conditions.

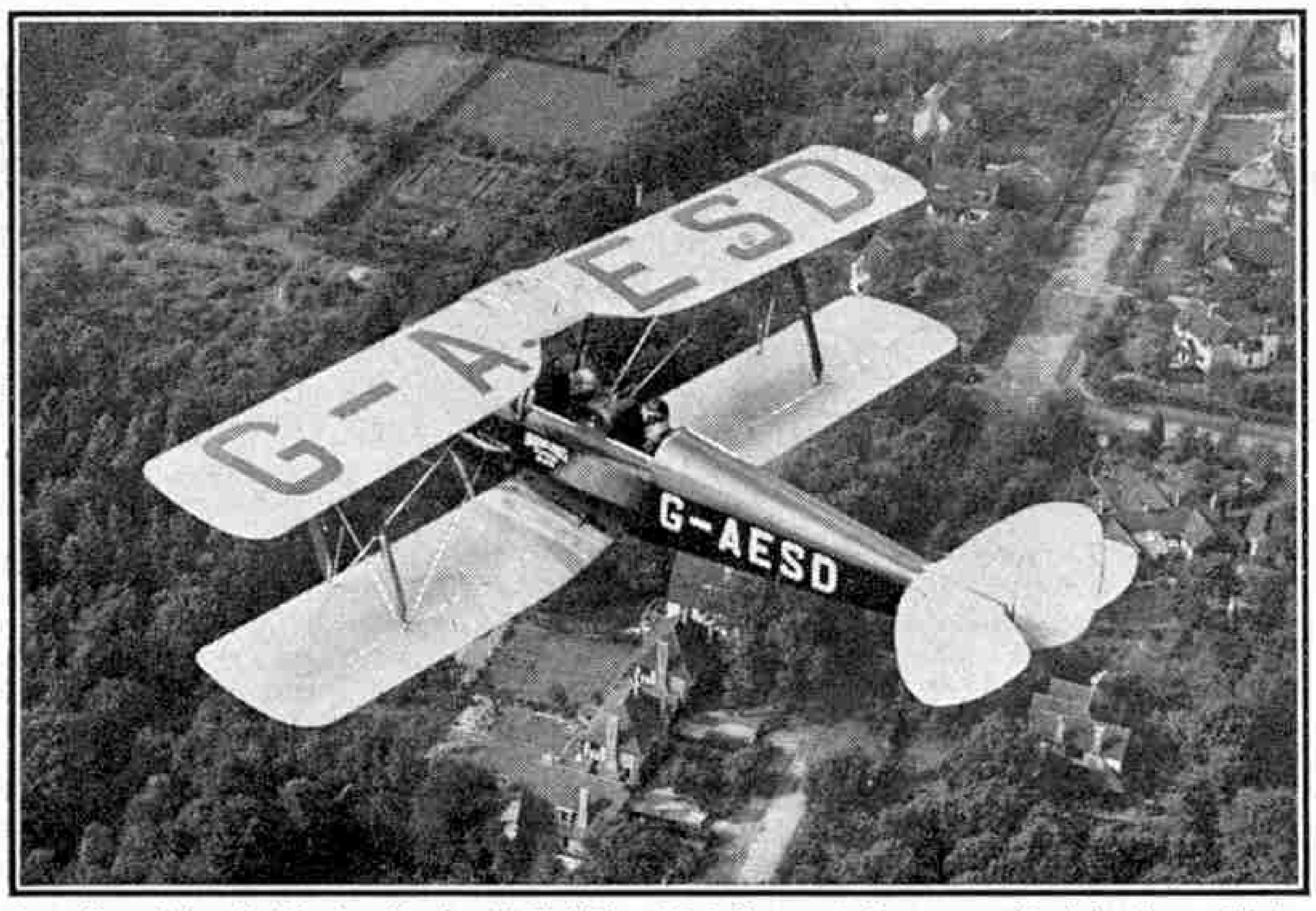
But before you can instruct you must qualify for the special instructor's certificate. To become eligible for this you must be in possession of a current "B" licence, have flown at least 250 hours, and been coached as an instructor in flying. This instruction can be had at most flying clubs, and costs anything from £20 to £40, provided that you have the necessary 250 hours of flying experience, otherwise you will have to pay for this as well at the usual rates per hour. The flying test is conducted by the Guild of Air Pilots and Air Navigators and lasts for about half an hour, during which you must not only prove that you are an excellent pilot, but also must show your ability to impart your knowledge. Your "B" licence is then endorsed by the Air Ministry to give instruction in flying, is valid for one year, and is renewable on evidence of at least 50 hours of instructional flying during the preceding year.



Practical training of ground engineers at Brooklands. There are five different Air Ministry licences for ground engineering, which must be renewed annually.

There are two other jobs the duties of which are performed in the air, those of the wireless operator and the navigator. The former has to be carried in aircraft capable of carrying 10 or more persons, when engaged in the public transport of passengers or goods. Two types of wireless operators licence are issued by the Postmaster-General to applicants who pass an oral and technical examination set by the Air Ministry; these are the radio-telephony and the radio-telegraphy licences. The former costs only £2 as a rule, and the training can be completed in a few days. Normally the pilot operates radio-telephony himself, but in the case of radio-telegraphy a separate person holding this licence is carried, and so it offers another career in aviation. This licence includes telephony and the training lasts several months. It is available at several aerodromes and wireless colleges.

As regards the navigator's licences, there are two types, the first and the second class. It is to a pilot's advantage to obtain these licences, as he can then command a much better job and salary. An applicant must be between 19 and 50, and must pass medical and theoretical examinations. For the first class navigator's licence, air experience as an operative member of the crew for at least four years is required, during which not less than 600 hours must have been spent in the air. Air experience for the second class licence must total two years, and 300 hours flying must be included in this.



A pupil receiving dual instruction in a D.H. "Tiger Moth" as part of a course of training for qualifying for the commercial pilot's "B" licence.

The training is available at most of the larger flying clubs. For the first class it takes from six months to a year and costs about 70 guineas, while the second class lasts from three to six months and costs something in the neighbourhood of 40 guineas. These licences are valid for two years and renewable after medical re-examination and proof of recent air experience.

It will be seen that there is a wide range of jobs in the air, but besides these positions there are many vacancies for ground posts that are equally interesting. For instance there are the posts of Control Officer at an Airport, managers and club secretaries, which require only a knowledge of aviation without the necessity of being able to pilot an aeroplane. The salary is on a level with that paid for similar posts at a social club.

In the aircraft factories, carpenters, metal workers, fitters, fabric and dope workers, machine tool setters and operators are employed in large numbers, and the wages are good owing to the tremendous skill and accuracy required. Hardly a week passes by without there being a host of vacancies for draughtsmen, stressmen and aircraft inspectors.

The ground staff of any flying organisation outnumbers the piloting staff, and the various air line companies and clubs require a large number of ground engineers for the inspection, maintenance and overhaul of the aircraft and engines. The Air Ministry issue five different licences for ground engineers—the "A" for inspection of aircraft before flight; "B" for inspection of aircraft after overhaul; "C" for inspection of aero engines before flight; "D" for inspection of aero engines after overall; and finally the "X" licence, which covers other duties including instrument repair, magneto overhaul and testing, and the packing and maintenance of parachutes.

There are several aeronautical engineering colleges where you can study for these licences, and they give both theoretical and practical training lasting from two to four years, the fees ranging from £200 to £300. On the other hand, some aircraft companies offer apprenticeship, and so lack of money should not prevent you from becoming a ground engineer. Theoretical training is obtainable at evening classes in technical schools or by correspondence courses if you wish. You must be 21 years of age before you can sit for the licences, and have had satisfactory practical experience in the duties for which the licence is required. Normally, you should possess two years of this practical experience, together with a sound knowledge of the internal combustion engine, aerodynamics, structures and strength of materials, and metallurgy. The licences are valid for one year, and can be renewed on evidence of recent practical experience in the duties covered by the particular licence.

The life of a ground engineer is an interesting one, and he holds a very responsible position, because the safety of the passengers and crew depends largely upon his work. No item, no matter how small, must be overlooked when inspecting the aircraft and its engines. He is responsible for signing the daily certificate stating that the machine is airworthy. Then there are periodic overhauls, and finally the annual overhaul of the complete aircraft, in which a thorough examination takes place and all worn parts are replaced. An Official of the Air Registration Board checks over the machine when all the work has been done, and if he is satisfied a new certificate of airworthiness is issued and the machine is ready to take the air once more in perfect condition.

Although the ground staff are more numerous than the piloting staff, it is clear that there are many opportunities offering a wide variety of careers in both these branches of aviation, and they will increase with the progression of commercial aviation.

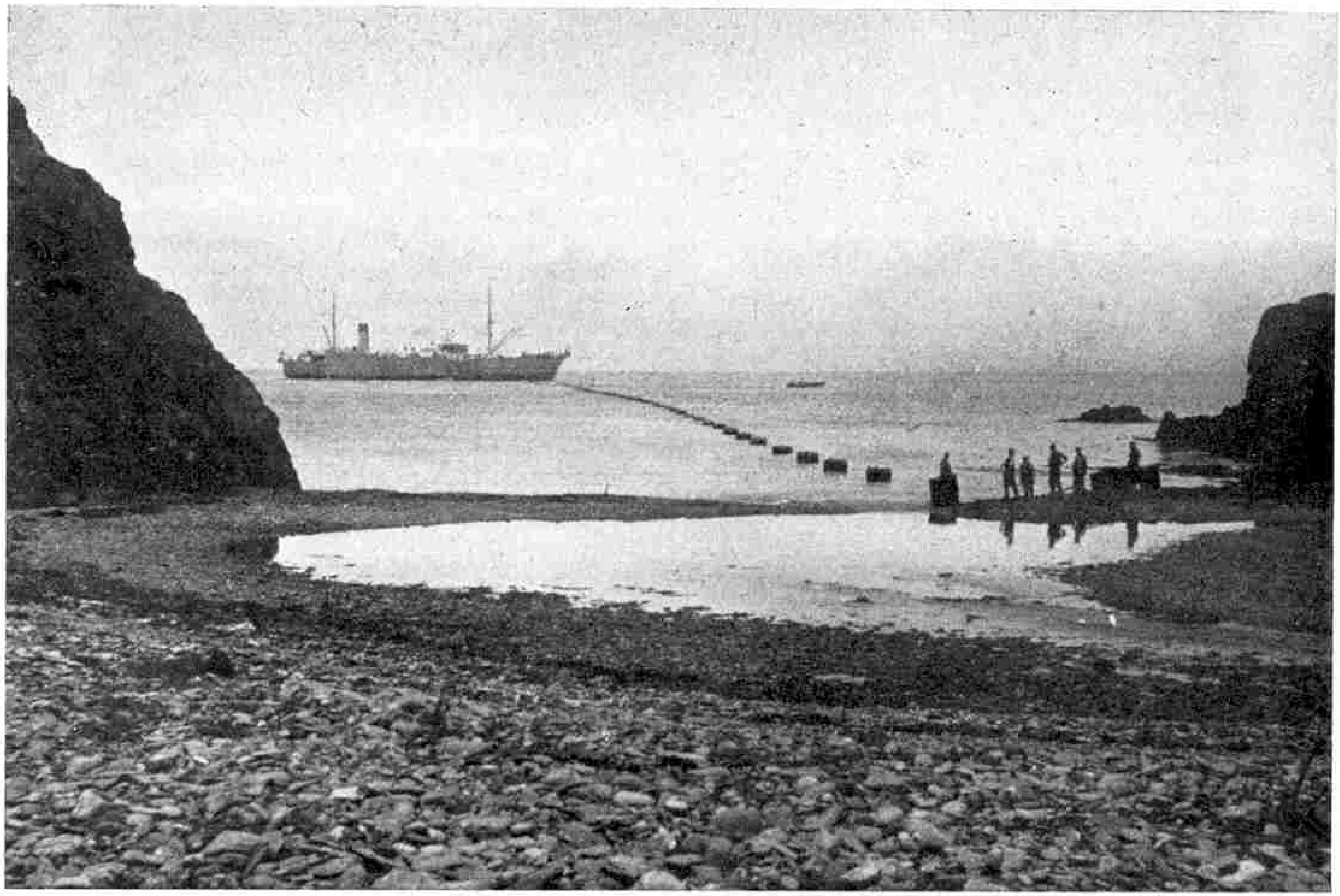
There is a great deal of fascination about a career in any branch of civil aviation, but readers who are considering such a career should bear in mind that they have little chance of success unless they are physically fit in every way and prepared to work hard to secure the necessary qualifications. At the same time the competition for the really good posts is very keen. The main essential to success is real enthusiasm for the job which will carry its possessor through all difficulties and enable him to face all setbacks undismayed.

New Lines for Overseas Telephones

How the Cable Layers Fight Rough Weather

THE great increase in recent years in the number of telephone calls between Great Britain and surrounding countries has made it necessary to lay more submarine cables across the various dividing channels. Two separate lines were laid in June 1937 between Aldeburgh, in Suffolk, and Domburg, on the island of Walcheren, in Holland. In the following September two cables were laid across the North Channel from Port Patrick to Donaghadee to supplement those already connecting Scotland with Northern Ireland, and on the same expedition a third was installed between Nevin in North Wales and Howth, in Eire.

All these cables are of a new type, employing a special insulation known as "paragutta." The first paragutta cable was laid down in 1935 across the Bass Strait, between Australia and Tasmania, as described in an article in the "*M.M.*" for October 1936. The British Post Office decided to standardise this type for its new lines, in order to limit the varieties of cable to be stocked by the department.



Landing the shore end of the Wales-Eire cable at Nevin from the cable ship "Faraday." The cable was floated ashore on barrels. For the illustrations to this article we are indebted to Siemens Brothers and Co. Ltd., Woolwich.

Paragutta cable is manufactured by Submarine Cables Ltd., Greenwich, and consists essentially of two concentric conductors, separated by paragutta insulation and surrounded by a metal armouring. The central conductor is a solid copper wire 0.138 in. in diameter, surrounded by six copper strips, each of which forms a segment of a circle, so that the six strips form a smooth tube when they are closed around the wire, the complete conductor weighing 508 lb. per nautical mile. Around this is placed a layer of paragutta insulation weighing 690 lb. per nautical mile.

At this stage of production the core undergoes preliminary tests. For this purpose it is coiled in drums, each containing a length of about one nautical mile, and the drums are then placed in a huge tank that holds 96 of them at once. The tank is charged with 400 tons of water and 15 tons of salt, and in this artificial sea water the core is left to soak for at least 36 hours, finally being tested electrically by direct current 14 days after manufacture.

Core that satisfies requirements is covered with a fabric protective tape and the return conductor, which comprises six copper strips of similar shape to those of the core, but much larger, which are applied in the same manner. Over this is wound the teredo tape, which protects the wire against the boring of the teredo, or ship worm, and another fabric tape, and the cable is then armoured with steel wires 0.280 in. in diameter embedded in jute. The finished cable has an overall diameter of 1.73 in., and every nautical mile of it weighs 9.6 tons when it is wet.

The cables across the North Channel and the Irish Sea were laid in the autumn of last year. The expedition was a particularly interesting one, as several different methods of landing the shore ends were employed, and the story of the operations shows how the cable layers fight storms and rough weather that threaten to make their labours useless.

The choice of methods depends on the depth of water, the draught of the cable ship, the nature of the beach, and other points. The simplest way is to draw the end of the cable straight from the laying vessel on to the beach. This method, which was adopted at Nevin, cannot often be used, however, as there must be sufficient depth of water to allow the ship to go close in to the beach, and conditions must be particularly favourable.

When hauling conditions are not suitable, as was the case at Howth, the ship's own power may be utilised. Two sand anchors are buried in the beach several yards apart, and sheaves are made fast to them. Two ropes are brought to the shore from the ship, one from the bow and the other from the stern, and these are passed round the sheaves and joined together, so that by hauling on the bow rope, the stern rope is pulled towards the shore, and vice versa. The cable end is attached to the selected rope, and by using the ship's gear for hauling, the cable itself is pulled to the beach.

Neither scheme is practicable when the cable line is not straight, however, and then a small auxiliary vessel of shallow draught is used. If the cable ship can approach close to the beach, and if there are no strong tides or currents, the amount of cable can be estimated accurately. This length is coiled into the auxiliary ship without cutting, and she then sets off towards the shore, laying the cable on the way and anchoring when she is close in to allow the remainder of the cable to be hauled ashore. This procedure was employed at Port Patrick, and shares the advantage of the two methods already described in avoiding a splice.

When there is any uncertainty as to the exact amount of cable required to reach the beach, and it is not desirable to land a surplus there, it is preferable to cut off the shore portion and coil it into the auxiliary vessel, which then lands the end and pays out seaward. The Donaghadee ends of the North Channel cables were landed in this manner.

In all the methods of landing shore ends, drums or barrels are fastened to the cable at intervals to float it off the sea bottom and reduce the strain of pulling. When the cable is in position, these supports are cut away, and the cable is allowed to sink.

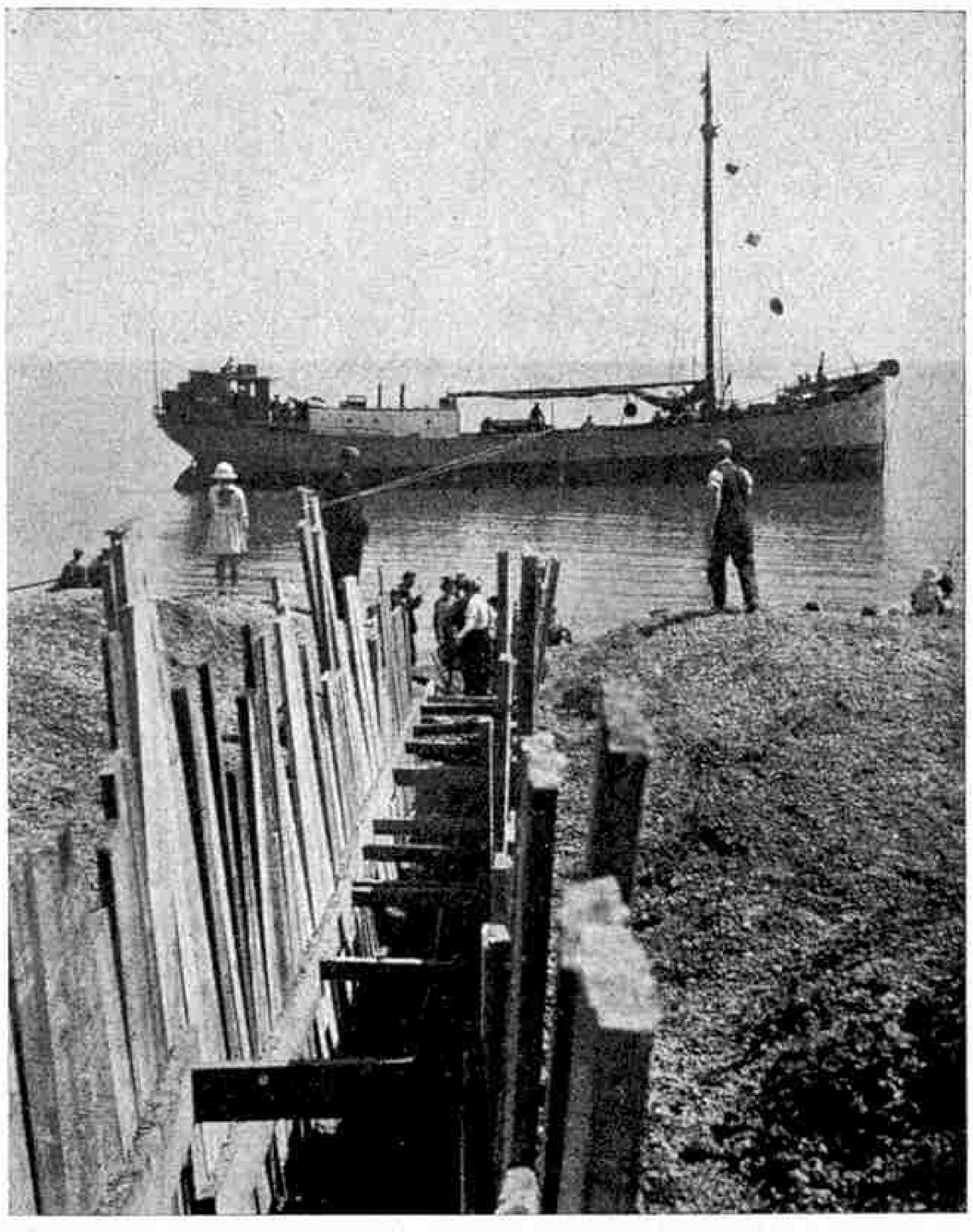
The cable ship "*Faraday*" left Greenwich on the Anglo-Irish expedition on Saturday, 4th September, with a load of 117.24 nautical miles of cable weighing 1,110 tons. After a smooth passage through the English Channel and the Irish Sea she arrived off Donaghadee on the following Tuesday morning, and the two shore ends were coiled into the auxiliary steamship "*May.*"

Attempts to land the ends the next day were frustrated by strong winds and rough seas, and the *"Faraday"* laid out a line of mark buoys mid-way between the routes of the two cables. One line of buoys was sufficient, as the greatest distance between the cable routes is only two miles. On 9th September the wind had abated, and as the tide permitted an early start, both shore ends were landed and hauled ashore, and the cable was paid out and buoyed by 3 p.m. This was fortunate, for the wind freshened later, and would have prevented further work. On Friday, the *"Faraday"* and *"May"* crossed to Port Patrick, but no work was possible on that day or the next owing to the strong winds.

Recovering a mark buoy during the laying of the Anglo-Dutch cables.

On Sunday morning the shore end of the northern cable was coiled into the *"May"* without cutting, and she started paying out towards the beach. Landing operations were completed by 10 a.m., the cable being floated in on drums and hauled ashore by hand. At 2 p.m. the *"Faraday"* commenced paying out along the northern route at about 6 knots, and reached the buoyed Donaghadee end within three hours, the final splice being slipped at 2 o'clock in the morning of Monday, 13th September, in 18 fathoms. The *"Faraday"* returned directly to Port Patrick and the operations were repeated for the southern cable. The final splice was lowered overboard at 1 a.m. on Tuesday, thus completing the laying of the two North Channel cables. The mark buoys were picked up, and the shore end gear was recovered from Port Patrick.

The *"Faraday"* then set off to lay the Nevin-Howth cable, but on Wednesday, 15th September, she had to shelter from a gale in Holyhead harbour. On the following day she laid a line of buoys to mark the eastern section of the route, and on Friday morning anchored off Nevin, about 700 yds. from the beach. The end was landed directly from the ship, being hauled up the beach by horse and man-power, and the ship commenced paying out at noon, the first section, 32 nautical miles long, being laid in six hours. The mark buoys were recovered the next day, and the ship anchored for the night off Dublin.



The shore end of one of the cables landed at Aldeburgh from the "Pallas." The supporting barrels have been removed, and paying out is about to begin.

On 19th September, the mark buoys were placed for the western section, and sand anchors and under-running sheaves were fixed in position on the beach, preparatory to hauling the cable end ashore by means of the ship's own power. Next day the ropes were run to the shore from the ship, which was anchored about 1,000 yds. off the beach, but strong wind and tides prevented further operations, and the cable was not landed until Tuesday, 21st September, when the ship commenced to pay out. The wind freshened, and was blowing with gale force by the time the *"Faraday"* reached the Nevin buoyed end. The cable therefore was over-laid, cut and buoyed in very adverse conditions. The gale continued on Wednesday morning, but died away in the evening, permitting the two buoyed ends to be picked up and the splice made on Thursday, after which the *"Faraday"* returned to London.

The cables between England and Holland had been laid earlier in the year, and the necessary operations were no less interesting than those in the Irish Sea. The first telephone cable between England and Holland was laid by the Post Office in 1922, and two others were laid previous to 1937. These also connected Aldeburgh and Domburg, and it was necessary to pick up the first, which had become obsolete, in order to make room for one of the new cables. The two laid last year are widely separated as they cross the North Sea, the greatest distance between them being six miles. They approach each other at their ends, but the landing points at Aldeburgh are about 600 yds. apart, and those at Domburg 400 yds. apart. At each end they are sheathed with lead over the paragutta for a length of half a nautical mile.

The actual cable laying was carried out by the *"Faraday,"* but there was insufficient depth of water off Aldeburgh and Domburg to allow this vessel to approach close enough to the beach to land the shore ends directly. The motor ship *"Pallas"* therefore was engaged for this purpose. Over the routes to be followed buoys were to be moored on tracks parallel to the cable lines to act as guides. Separate lines of buoys were necessary, as the cables were to be laid so far apart that the buoys on one route would have been too far away to be a guide for the other, and buoying operations actually were carried out four times.

The *"Faraday"* left Greenwich on 3rd June 1937, loaded with 171.5 nautical miles of cable weighing 1,626 tons, and proceeded down river. Off the Nore, the *"Pallas"* was loaded with the two English shore ends, and both vessels then proceeded to Aldeburgh, where they arrived early on 5th June. The shore end of the northern cable was laid by the *"Pallas"* in fine weather, and the seaward end was buoyed. On the following day the operations were repeated for the southern cable. In both cases the *"Pallas"* was able to approach within about 200 yds. of the beach, and the cable was floated by attaching it to barrels and finally hauled ashore by a gang of men as it was paid out from the motor ship. The lower illustration on this page shows landing operations in progress.

The *"Faraday"* then laid buoys to mark the English half of the route of the northern cable, and visibility was so poor that this took two days. She returned to pick up the buoyed end of the more northerly of the two lengths laid down by the *"Pallas,"* and this was spliced on to the cable carried in the tank aboard the vessel. Paying out commenced early next morning. The vessel steamed along parallel to the line of buoys at a speed of about 6 knots while the cable was paid out over the bow sheave, and the buoy marking the end of the section was reached about 2 p.m.

Another day was occupied in picking up the mark buoys and re-laying some of them along the Dutch half of the route, poor visibility again delaying these operations. Then the *"Pallas"* was loaded with the northern Dutch shore end, which was paid out and buoyed, one end being taken ashore at Domburg. The remainder of the mark buoys were laid by the *"Faraday,"* and their positions verified, and this vessel then returned to pick up the buoyed end of the shore section and to splice it on to the tank cable. Paying out on this section commenced at dawn on the 13th, and shortly after noon the English end was picked up, and after the necessary electrical tests, the closing joint was made and the final splice slipped. The southern cable was laid in a similar manner, although bad weather interfered with operations.

Acknowledgements are due to Siemens Brothers and Co. Ltd., Woolwich, by whom the laying operations were carried out, for information contained in this article.

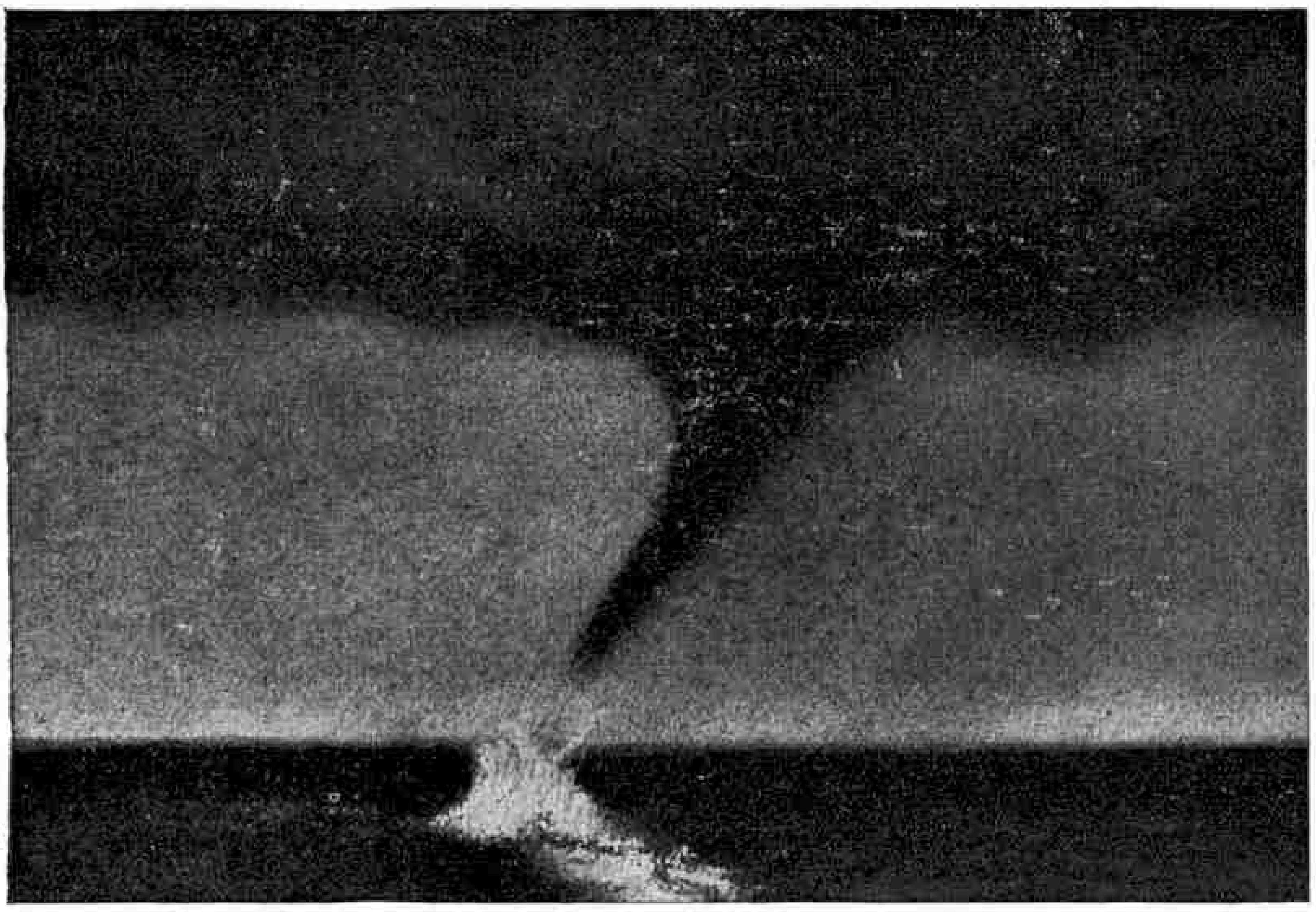
Books to Read

Here we review books of interest and of use to readers of the "M.M." We can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"The Air and Its Mysteries"

By C. M. Botley. (Bell. 8/6 net)

Every year we realise more and more how important to us is the ocean of air in which we live, and it is good to have a reliable book in which its mysteries are explained. Miss Botley's account will appeal to readers of all kinds. Those who are scientifically inclined will find in it satisfactory treatment of this aspect of the subject, and others will be delighted with her stories of the wind, clouds and thunderstorms, climate and the little-known regions many miles above the Earth's surface.



A waterspout. From "The Air and its Mysteries," reviewed on this page.

After explaining the contents of the atmosphere, the author turns to the way of the wind, describing how its force and speed are measured, and giving the reasons for the steady winds that characterise certain regions of the Earth. The clouds next claim attention. As the author remarks, they have been noticed and talked about for generations, but to-day they are closely inspected and photographed, and their growth and decay recorded. How they are formed, and why they differ in shape, is fully told.

From clouds we pass to rain, and we find that the highest yearly total yet recorded in Great Britain is the 247 inches that fell at Llyn Llydaw, Snowdon, during 1909. This is a small amount in comparison with the average rainfall of 450 inches in the mountains of Assam, where a year's rainfall would form a lake nearly 40 ft. deep!

How the rainbow is formed, what happens during a thunderstorm, and the changes that give rise to various kinds of weather are then explained, with accounts of extraordinary floods and storms. It is surprising to learn that in one day a cyclone expends sufficient power to work all the world's machinery for three or four years; while during a gale in the English Channel the power blowing to waste on every square mile would be worth £750,000,000 if it could be converted into electricity to be paid for at ½d. per unit.

Even more interesting facts are revealed in chapters dealing with light and sound effects in the atmosphere, including mirages and sunsets, and finally come sections dealing with the highways of the air and its mysterious upper regions. There are 16 full page plates and 23 diagrams.

"Wings Over Asia"

By L. Thomas and R. Barton. (Harrap. 6/- net)

Rex and Tommy, two American boys, are taken in a big amphibian aeroplane on an imaginary flying trip from the United States to Asia. They fly by way of Alaska and the Bering Strait, crossing on the way the international date line, where to-day suddenly becomes to-morrow to flyers going westward. Their first glimpse of Asia is provided by the bleak snow-covered mountains of Kamchatka. Then they reach the Island Empire of Japan, and from that time onward encounter thrill after thrill. They explore Korea, Northern China and Mongolia, fly over Tibet before visiting China proper, and then pass on to Hong Kong, Indo-China, Siam and the Malay Peninsula.

Everywhere the air travellers go they see how people live, examine their houses, share their meals and watch them at work and at play. For instance, they learn the secrets of the silk industry, visit the rice fields of a farmer who is amused by their ignorance of his tasks, and enjoy bird's-nest soup in a Chinese home. More adventurous experiences are a visit to the head hunters of the island of Tai-Wan, or Formosa as it is known to westerners, and a fight with brigands who attack a caravan they join during a fascinating trip in Tibet. They also help to trap a prowling tiger in Malaya.

Every scene in the book is depicted vividly and in a most entertaining manner, and its pages are crowded with interesting details in which every reader, old or young, will revel. Except for a real trip to Asia, there could be no better way of seeing the strange panorama of life in that continent than by reading this simple and direct narrative. The book is illustrated by 150 well-chosen photographs.

"Scouting Suggestions"

By Kenneth C. Sparrow, B.Sc., A.K.C.
(Brown, Son and Ferguson. 1/6 net)

Mr. Sparrow is an experienced Scoutmaster, who for a long period also was Leader of a Meccano Club. He has been remarkably successful in Scout work, and his book is in substance an account of the manner in which he runs his own troop. It is essentially practical, dealing in turn with programmes for troop meetings, wide games and the conduct of summer camps, and with the organisation of Parent's Evenings and display items.

A series of miscellaneous suggestions completes the book, every page of which displays the real spirit of scouting. Even if the methods described are not favoured by any individual reader they will help him to improve his own, and the book is so good that the author might well have omitted the apologetic description of his work as suggestions.

"Six Pantomimes for Scouts"

By Douglas Berwick
(Brown, Son and Ferguson. 1/6 net)

Group shows and troop entertainments generally play an important part in scout life, and their value is well recognised at Imperial Headquarters. Plays are particularly useful, but must be straightforward and human, and of a type that can be appreciated, not only by those taking part in them, but also by their audiences. Mr. Berwick's pantomimes, ranging from "*Robinson Crusoe*" to "*Cinderella*," fulfill these conditions. The characters in them speak naturally and easily, and a bright entertainment without pauses will be the result of presenting any one of the plays in accordance with the suggestions here given. In the author's own words all are indeed "jolly good fun."

"Mechanic's Workshop Handybook"

By Paul N. Hasluck
(Technical Press Ltd. 3/- net)

This well-known guide to the working and manipulation of metals has been reprinted in response to repeated demands. It begins with an account of the constitution and characteristics of the metals and alloys familiar to mechanics, and then proceeds to deal with the various processes and operations that are carried out on them. Excellent practical directions are given on solders and soldering, filing, drilling and the polishing and finishing of metals, and special attention is devoted to the handling and treatment of tools. A surprisingly large variety of work is covered in detail in this concise and valuable guide.

"The Brunels, Father and Son"

By Celia Brunel Noble
(Cobden and Sanderson. 15/– net)

The engineering world has seen no more remarkable pioneers than Sir Marc Isambard Brunel and his son Isambard. This story of their lives, written by the grand-daughter of the younger Brunel, does full justice to their engineering achievements, but is written chiefly from a personal standpoint. In it we see the pioneers in their home circles and against a background of society, and also among railway promoters and shipowners, the one original and inventive, and the other so daring in his gigantic schemes that even his failures can be ranked as great works.

The elder Brunel was a romantic figure whom we meet first as an unruly boy in a little village in Normandy, who obstinately resisted his father's attempts to make him a priest, preferring to spend his time in an improvised workshop. Later he expressed his views on the execution of the French King during the Revolution too freely, and for safety was compelled to flee to America. There he endured hardships in survey work and exploration in undeveloped parts of the country, and eventually came to England with highly original plans for making blocks or pulleys for ships. His machines were set up in Portsmouth Dockyard, and provided the first example of mass production methods in this country.

Brunel was inadequately paid for his splendid work, however, and disaster followed his establishment of sawmills and of a factory for making good army boots, with the result that he found himself in a debtors' prison. A belated Government grant led to his release and he soon became active again, especially in the scheme for tunnelling under the Thames. This was then thought impossible, but Brunel invented a shield that was to bore its way through the clay and mud under the river, and work on the scheme began in 1825.

To read the story of the long struggle Brunel waged with every obstacle during this task is to realise how great an engineer he was. The difficulties were stupendous. Water broke into the workings several times, causing damage and loss of life, and the work was delayed, and on one occasion stopped, for lack of money. The engineer never lost confidence, however, and the tunnel was completed 17 years after the first brick was laid. Brunel was then an old man, ruined in health by his exertions; and we see him in his last years, a complete invalid remarkable for his cheerfulness.

The achievements of his son Isambard Brunel are familiar to most readers of the "*M.M.*" As a youth he helped in the building of the Thames Tunnel, working night and day underground and having several narrow escapes from being drowned when water broke through.

His first great work was the design of the Clifton Suspension Bridge at Bristol, which was only finished after his death as a memorial to him. Then began his life's work—the construction of the Great Western Railway—and the book gives us many pictures of the "Little Giant," as someone called him in those early days, in his struggles with directors and opponents. He also built many ships, his earliest being the "*Great Western*," which in 1838 created the first transatlantic record, and his last the "*Great Eastern*," the noblest of his failures.

"Over the North Pole"

By George Baidukov. (Harrap. 5/– net)

The Arctic is steadily being conquered by the aeroplane, and the astonishing flights in Polar regions by Russian airmen, who actually landed the members of an expedition at the North Pole itself, suggested a flight across the top of the world from Russia to North America.

Three Soviet airmen, one of whom was the author of this book, eventually were given permission to make this flight, and how they succeeded is here told briefly and in homely fashion. There is nothing sensational in the writing, but readers share in the hours of bitter struggle with Arctic storm, when ice began to form on the wings of the ANT-25 in which the flight was made; in the difficulties of flying at high altitudes over the Rocky Mountains, with the oxygen supply running short; and in the final triumph, when the radio beams of Pacific coast aerodromes guided the flyers to a safe landing at Portland in the United States. In a single bound of 5,507 miles the airmen had reached that city from Moscow.

The classification disc and letter on a G.W.R. engine. From "G.W.R. Engines," reviewed on this page.

The flight was followed later in the year by a longer one, in which a new non-stop long-distance record of 6,305.7 miles was created, but this in no way detracts from the fascination of a splendid account of a magnificent pioneer achievement. The book is excellently translated. It has an introduction by Stefansson, the famous Arctic explorer, and is well illustrated.

"Aero and Auto Engine Facts and Data"

By H. R. Langman. (Technical Press Ltd. 2/6 net)

The purpose of Mr. Langman's little book is to provide students, designers and practical engineers concerned with the internal combustion engine with technical facts and figures in concise and handy form. There are five sections. The first gives elementary formulæ, with details of the four-stroke and two-stroke cycles of operations, and the second deals with the engine considered from a mechanical standpoint. The remaining sections are devoted to engine cooling and valves, ignition and fuels respectively. Where necessary the formulæ and figures given are explained by means of simple diagrams.

"G.W.R. Engines"

(G.W.R. Price 1/–)

All railway enthusiasts, and particularly those who are supporters of the G.W.R., will welcome the appearance of this enlarged and revised edition of the G.W.R. publication dealing with the locomotives of the company. The new book retains the principal features of previous editions, and incorporates much new material. It contains complete lists of named G.W.R. locomotives, with photographs and dimensioned drawings of each of the standard classes, and altogether 15 types of tender engines and 11 of tank engines are included in this section.

Interesting chapters deal with the naming of locomotives, and the numbers, types and classes of G.W.R. engines and their classification according to hauling capacity and to the routes over which they may run. There is a brief historical survey, and further sections deal with Swindon, the birthplace of G.W.R. engines, the growth of locomotive power, the naming of trains and train speeds. Details are given of such famous expresses as the "*Cornish Riviera Limited*" and the "*Cheltenham Flyer*," and there is a useful alphabetical index to the named engines of the G.W.R. At the end of the book are blank pages ruled for use when making notes on a journey, or in the course of "number catching."

"L.N.E.R. Locomotives 1938"

(Locomotive Publishing Co. Ltd. Price 1/–)

This attractive addition to locomotive literature is published with the authority of the L.N.E.R. It consists of 48 pages, in which are included 30 illustrations of L.N.E.R. engines and famous expresses such as "*The Flying Scotsman*," "*The Silver Jubilee*," and "*Coronation*." The text describes the locomotive policy of the L.N.E.R., which since the grouping of 1923, when the company came into possession of 7,392 locomotives, has resulted in the reduction of the number in service to 6,576 at the end of last year.

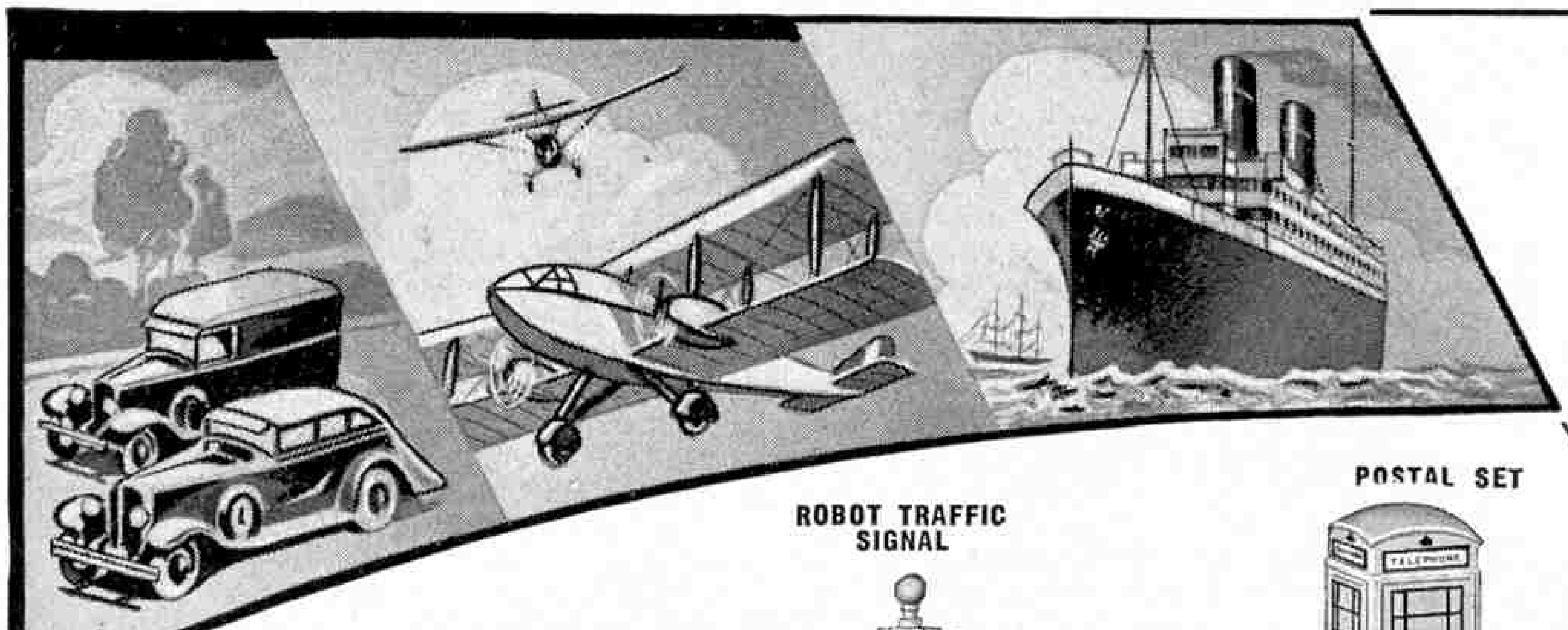
Each of the standard classes of L.N.E.R. locomotives is described, commencing with the well-known Gresley "Pacifics." Details of the work for which each class has been introduced are given, and special locomotives such as the "Beyer-Garratt" banking engine, the most powerful in the British Isles, are not neglected. There are lists of named locomotives in L.N.E.R. service, and a table giving the chief dimensions of various L.N.E.R. locomotives.

"How to Recognise Southern Railway Locomotives"

By R. W. Kidner. (The Oakwood Press. Price 1/6)

This useful little book is intended chiefly for the pocket of the train-watcher, and of the traveller on the S.R. who likes to be able to identify the various engines that he sees. The information included in it is necessarily condensed, but once the owner becomes accustomed to its arrangement, and to the few abbreviations used, there is no difficulty in picking out a particular class of locomotive.

The various types of S.R. locomotives are illustrated by thumb-nail sketches, and the information given includes their origin, the designer and the place of building, the serial numbers of the class, the number in service and the duties upon which they are employed. Types of S.R. electric trains also are illustrated by end-on sketches.



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interest every boy and girl.

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Dinky Toys No. 23m
A fine scale model of the car in which Capt. G. E. T. Eyston set up a world land speed record of 312 m.p.h. at Bonneville, Utah, U.S.A., in 1937.
Price **1/-** each

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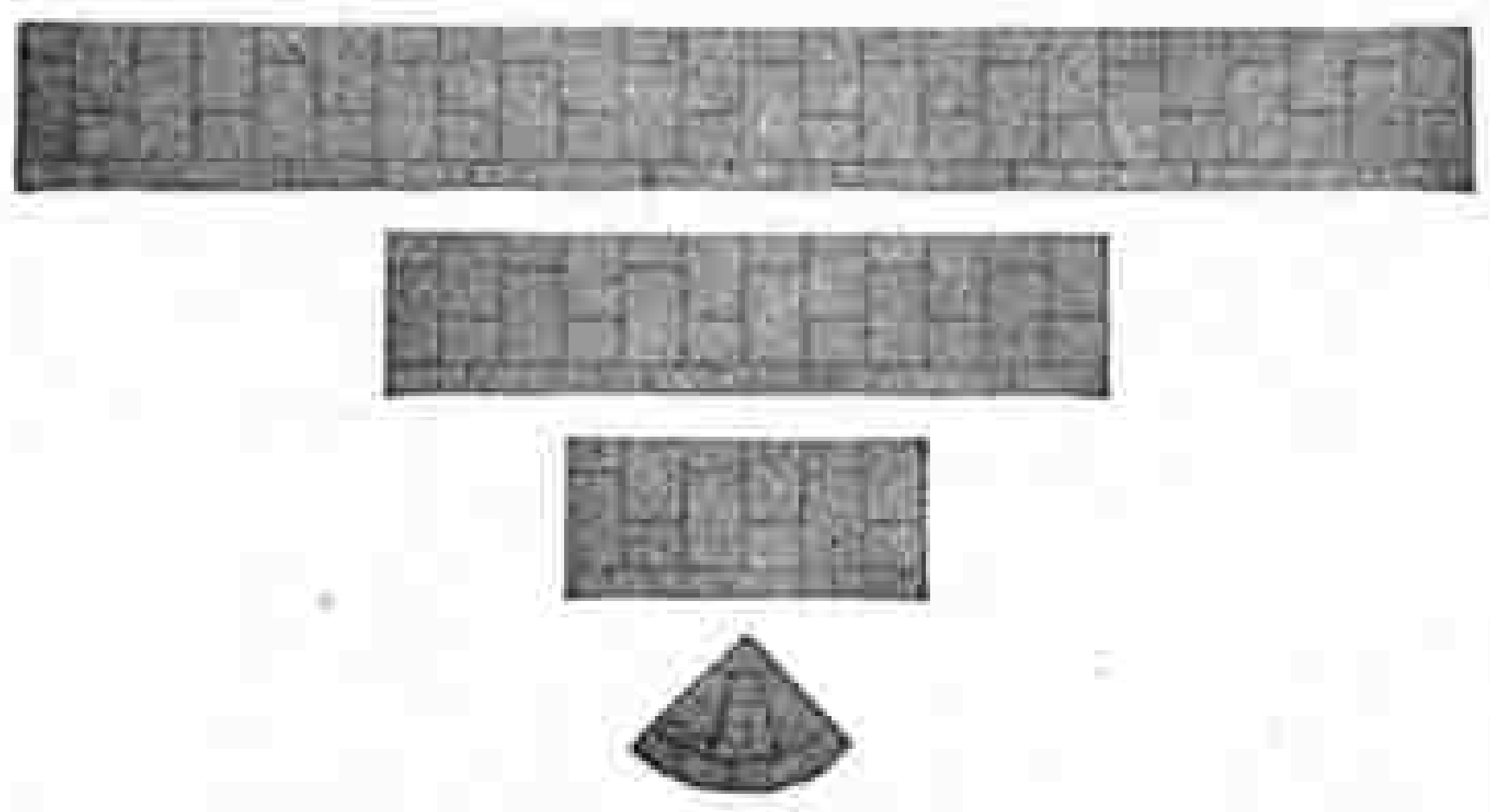

Dinky Toys No. 46
The contents of this set are four 3 in., six 6 in. and four 12 in. strips of pavement and four quarter discs for corners. Price of complete set **6d.**

DOUGLAS D.C.3 AIR LINER

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A scale model of a Douglas D.C.3 air liner, a type in regular service on American and European routes.
Price **9d.** each

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Dinky Toys No. 60r
Scale models of the latest Imperial Airways Flying Boats. Twelve models available named: *"Caledonia," "Canopus," "Corsair," "Challenger," "Centurion," "Cambria," "Calpurnia," "Ceres," "Clio," "Calypso," "Corinna"* and *"Cheviot."* Price **1/-** each

ATLANTIC FLYING BOAT

Dinky Toys No. 60x
Similar in type to the Empire Flying Boat. Assorted colours.
Price **1/-** each

ROBOT TRAFFIC SIGNAL

Dinky Toys No. 47a
(Four face)
Price **3d.** each
No. 47b (Three face)
Price **3d.** each
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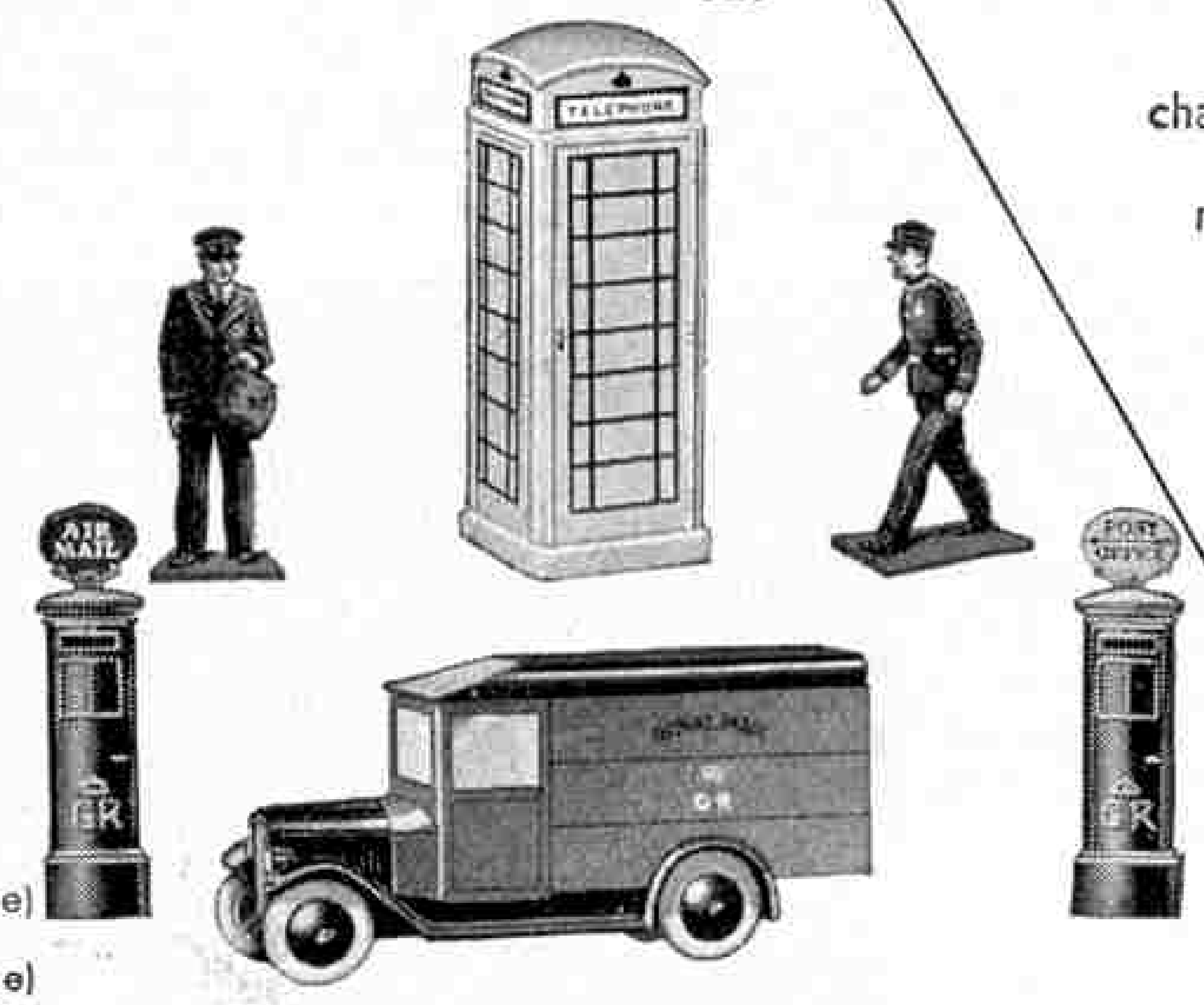
Right-angle or back-to-back. Price **3d.** each

BEACON

Dinky Toys No. 47d
Realistic model of the Belisha Safety Beacon.
Price **1d.** each

POSTAL SET



Dinky Toys No. 12

No. 12a Pillar Box, G.P.O.	each	**3d.**
No. 12b " " Air Mail	"	**3d.**
No. 12c Telephone Call Box	"	**4d.**
No. 12d Telegraph Messenger	"	**3d.**
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No. 34b Roval Mail Van	"	**10d.**

Price of complete set **2/3**

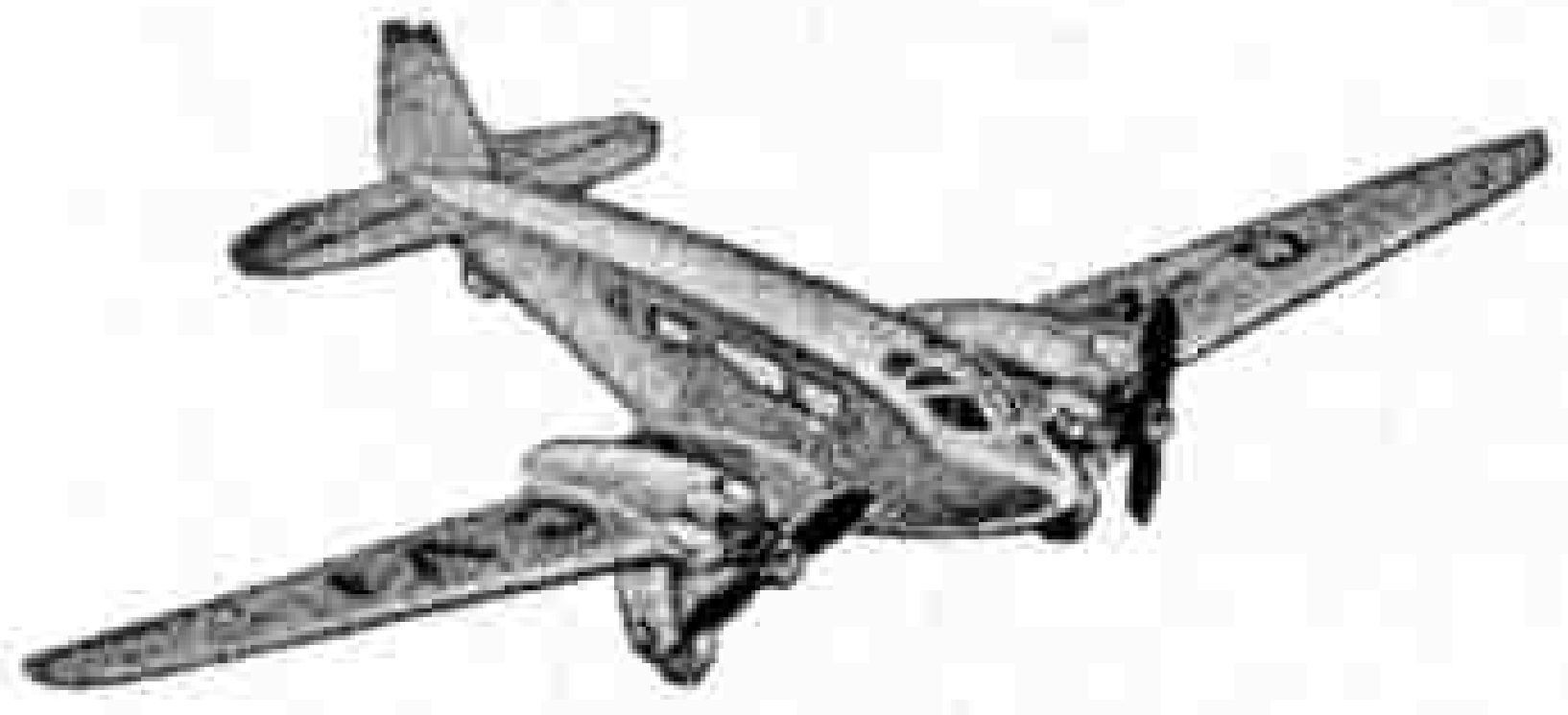
Ask your dealer to show you the complete range of Dinky Toys.

ROYAL AIR MAIL SERVICE CAR

Dinky Toys No. 34a
In correct colours and fitted with detachable rubber tyres.
Price **6d.** each

PRODUCT of MECCANO LIMITED LIVERPOOL

AIRSPEED "ENVOY" MONOPLANE



Dinky Toys No. 62m
Scale Model of the Airspeed "Envoy" twin-engined commercial monoplane. Assorted colours. Price **6d.** each

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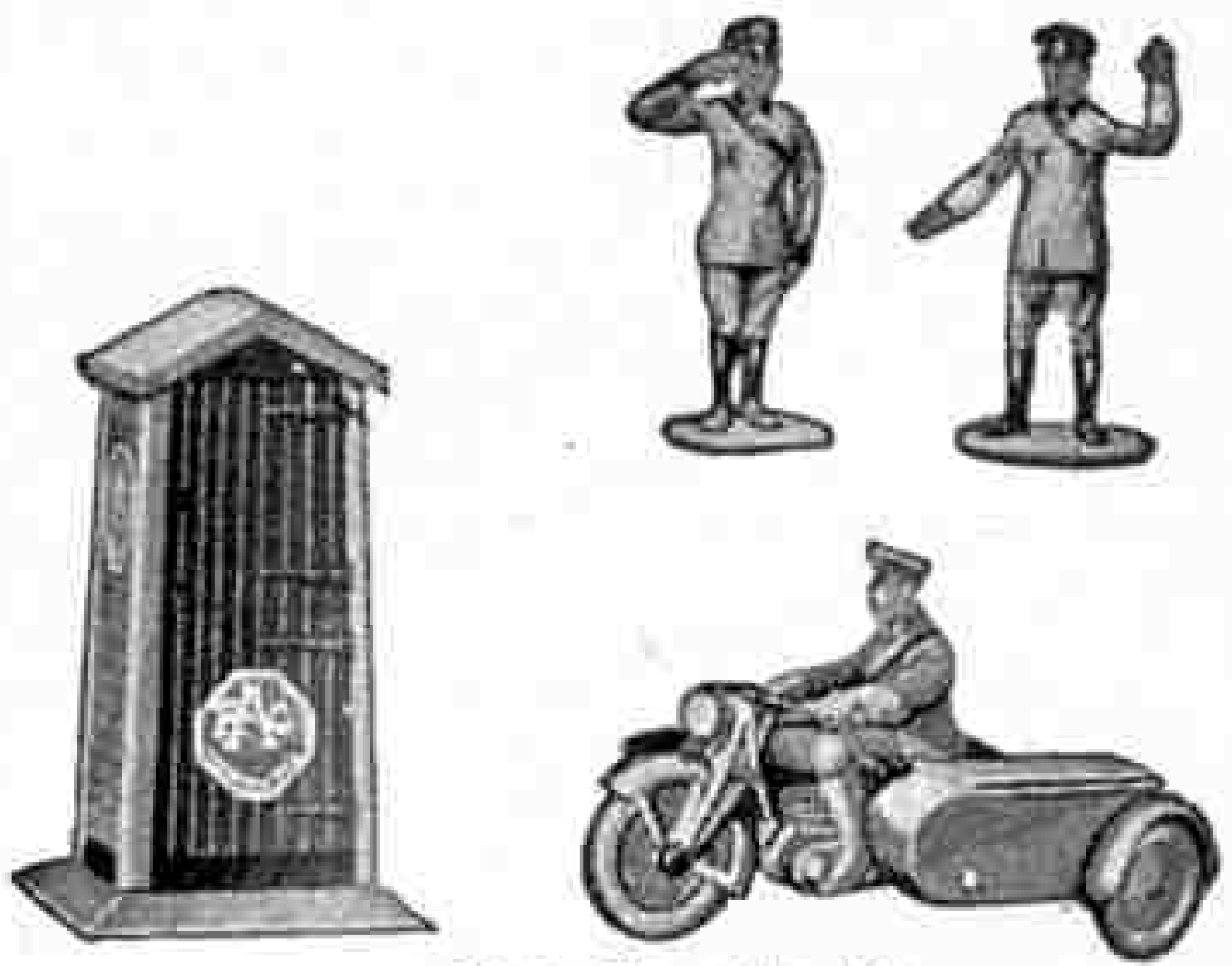
Dinky Toys No. 62k
Scale model of the Airspeed "Envoy" supplied to the Air Council for the King's Flight.
Price **8d.** each

R.A.C. BOX, MOTOR CYCLE PATROL AND GUIDES



Dinky Toys No. 43
This set is representative of the familiar personnel and road box of the R.A.C. Each item is finished in correct colours.

No. 43a R.A.C. Box	each	**6d.**
No. 43b R.A.C. Motor Cycle Patrol ...	"	**9d.**
No. 43c R.A.C. Guide directing traffic ...	"	**3d.**
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Price of complete set **1/9**

REFUELLING TENDER Fit

Dinky Toys No. 60y
Realistic model of Thompson Bros. Tender used for refuelling aeroplanes at aerodromes.
Price **8d.** each

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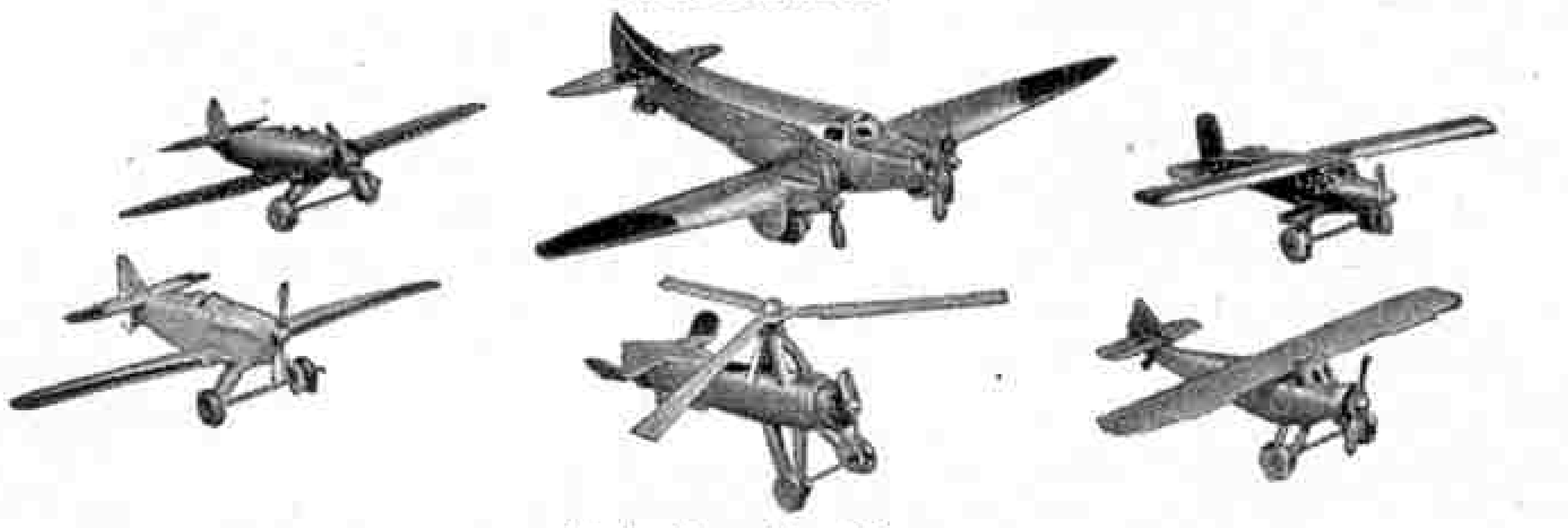
AEROPLANES.



Dinky Toys No. 60z
The set consists of six models of famous French aeroplanes—"Arc-en-Ciel," Potez 58, Hanriot H180T, Breguet-Corsaire low wing monoplane, Dewoitine 500 and Cierva Autogiro. (Made in the Meccano Factory in Paris) Price **3/-**

MONOPLANE "ARC-EN-CIEL." Dinky Toys No. 60az
A scale model of the famous French triple-engined monoplane "Arc-en-Ciel." (Made in the Meccano Factory in Paris) Price **9d.** each

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Dinky Toys No. 60v
Scale model of the "Whitley" long-range heavy bomber adopted by the R.A.F.
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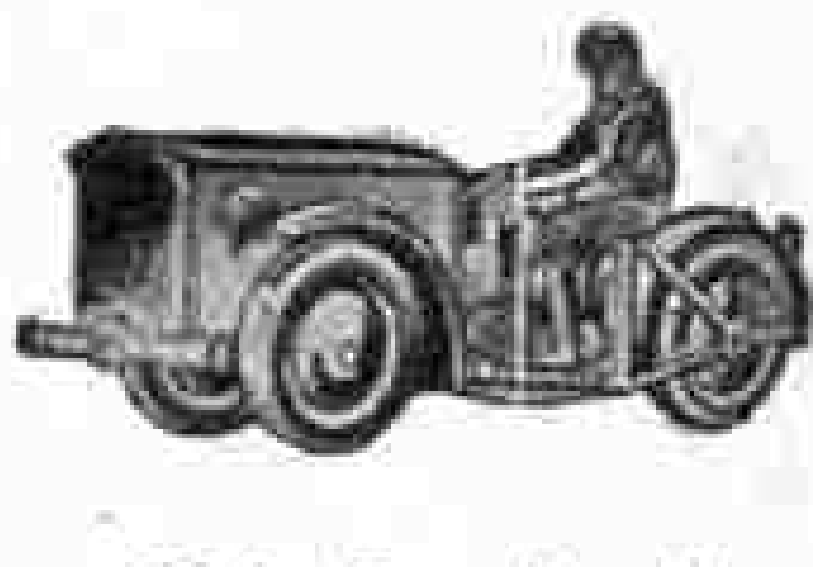
FLYING BOAT "CLIPPER III"

Dinky Toys No. 60w
Scale model of the Pan American Airways flying boat that took part in the transatlantic experimental flights in 1937.
Price **1/-** each

THREE-WHEELED DELIVERY VAN



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Fitted with opening li
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(Made in the Meccano Fa
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can be devised.
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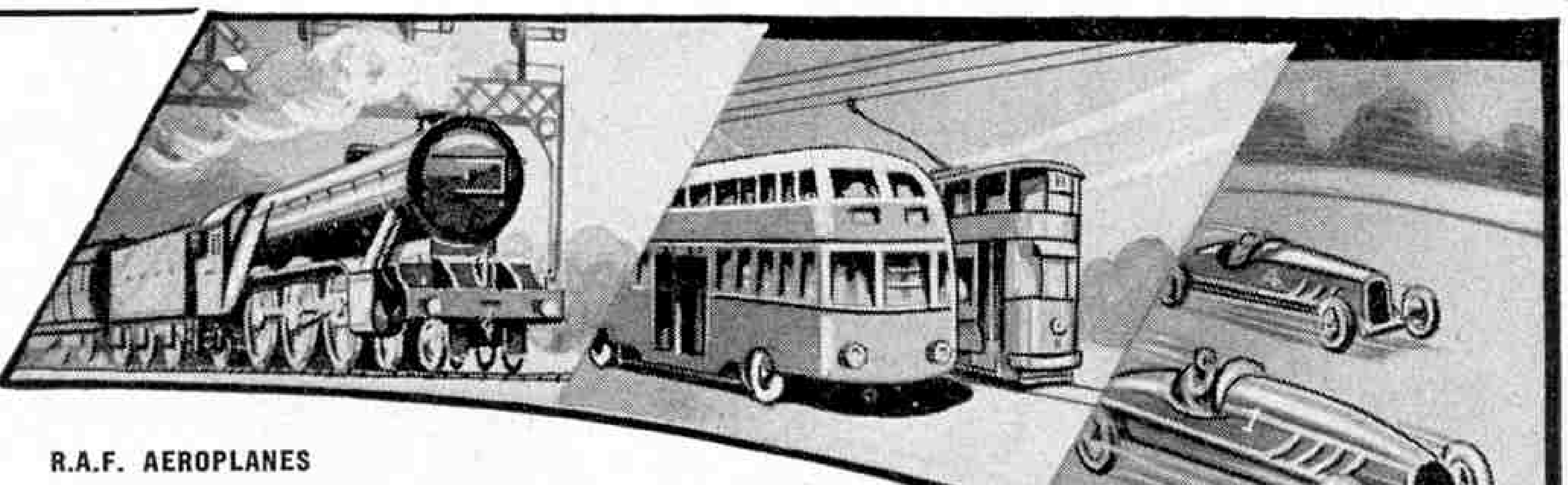
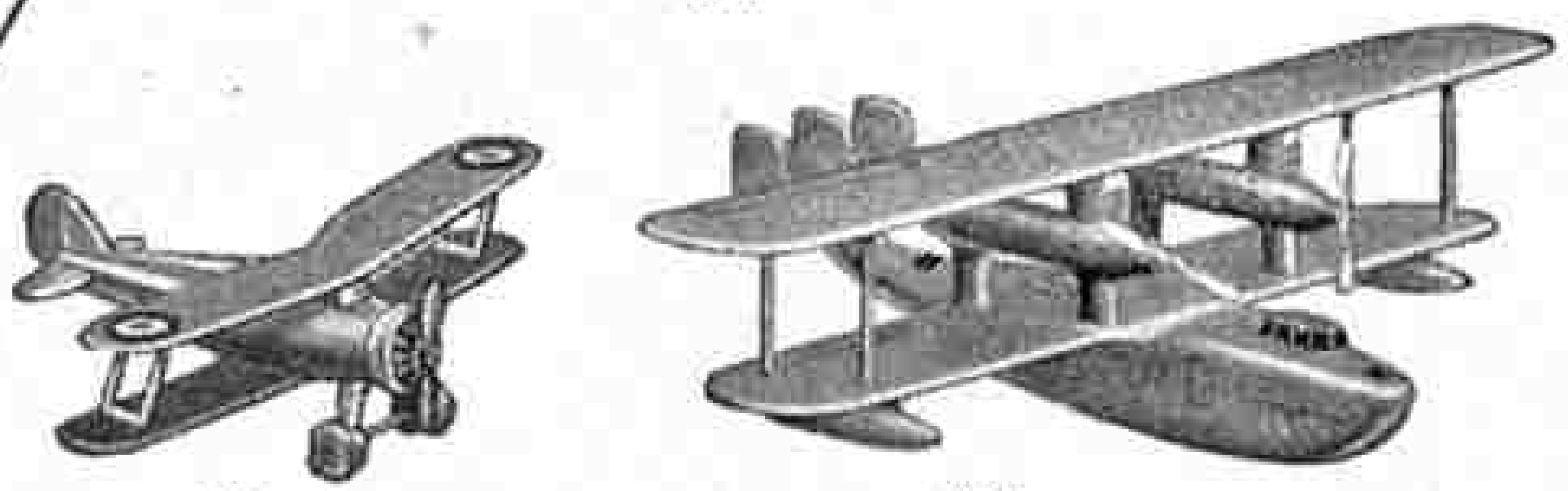


R.A.F. AEROPLANES

60n



60p 60h

Dinky Toys No. 61

No. 60h	"Singapore" Flying Boat	each	**1/-**
No. 60n	Fairey "Battle" Bomber (2)... ...	"	**4½d.**
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Price of complete set **2/9**

MEDIUM BOMBER

Dinky Toys No. 60s

Similar to Fairey "Battle" Bomber (No. 60n), but with new Air Ministry Shadow Shading. Price **6d.** each

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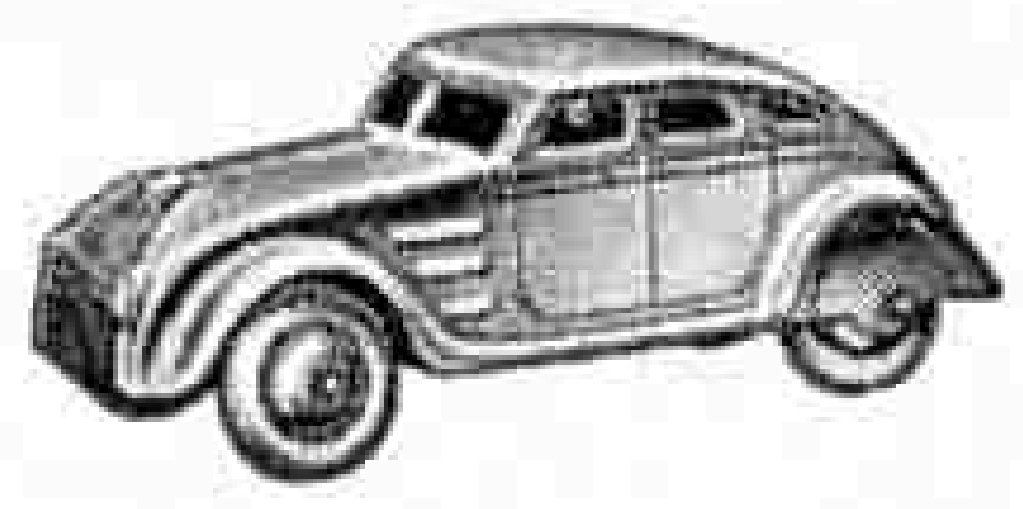
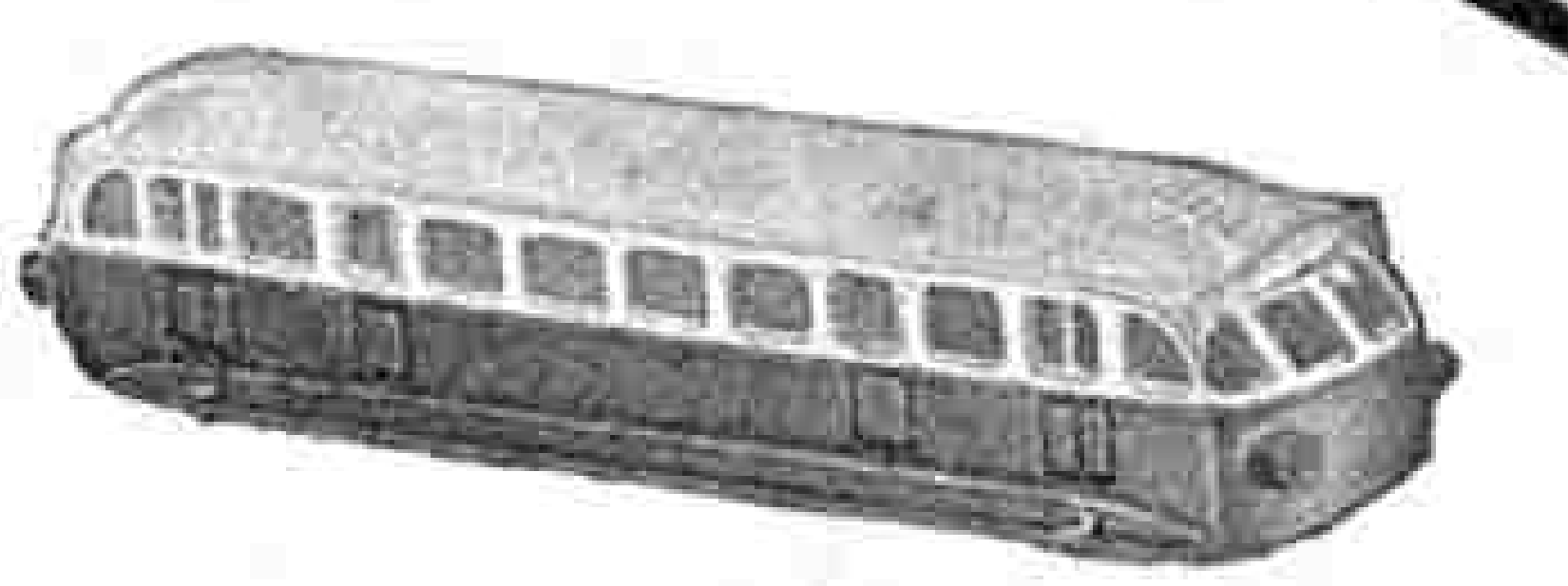


Dinky Toys No. 22h
Assorted colours. Fitted with detachable rubber tyres.
Price **4d.** each

DIESEL RAIL CAR



Dinky Toys No. 26z
A realistic model of a modern Diesel-engined rail car. Price **5d.** each
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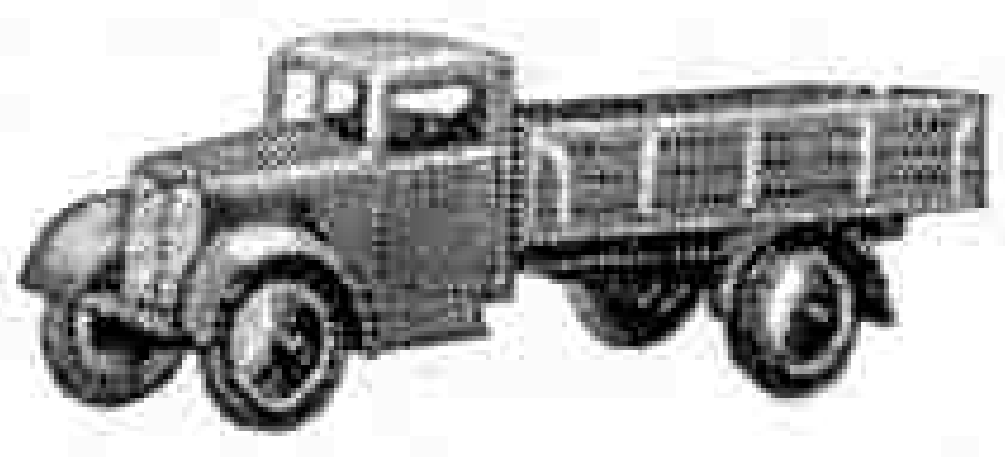
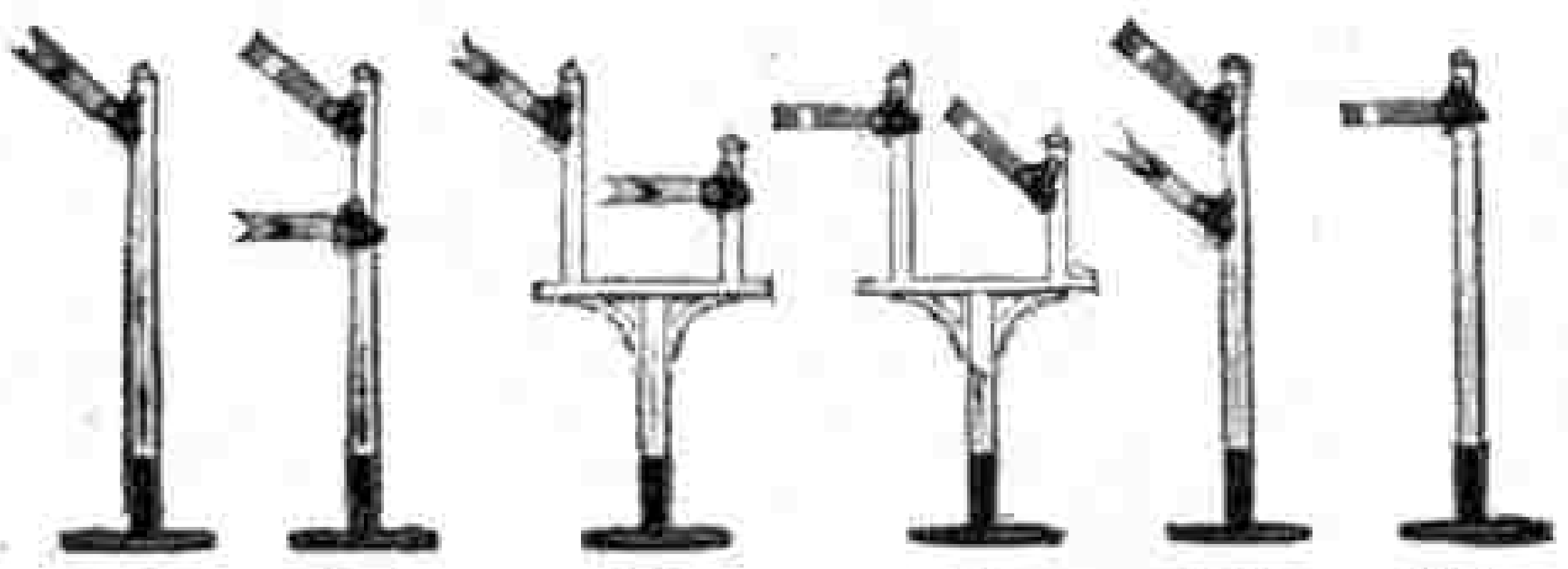


Dinky Toys No. 22c
Assorted colours.
Fitted with detachable rubber tyres.
Price **6d.** each

RAILWAY SIGNALS



15a 15b 15c 15c 15b 15a

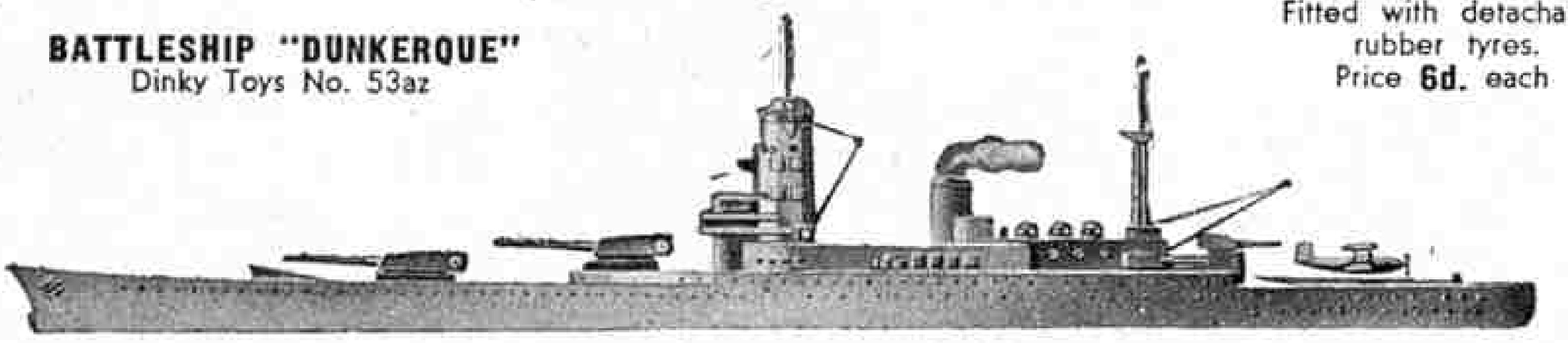
Dinky Toys No. 15

No. 15a	Single Arm Signals ("Home" and "Distant")	each	**2d.**
No. 15b	Double Arm Signals (two in set)	"	**3d.**
No. 15c	Junction Signals ("Home" and "Distant") ...	"	**4d.**

Price of complete set **1/6**

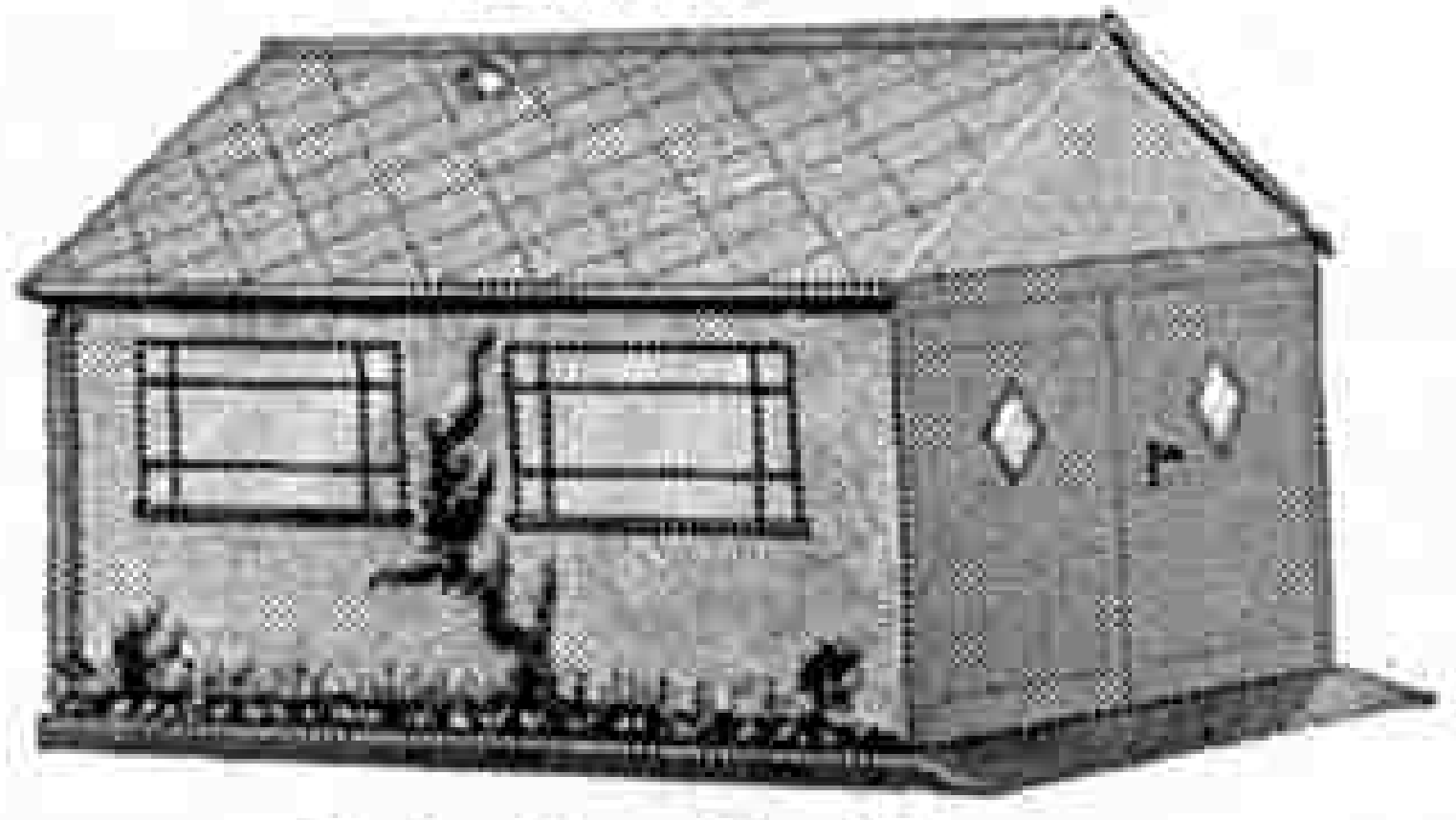
BATTLESHIP "DUNKERQUE"

Dinky Toys No. 53az



Scale model of the French 26,500 ton Battleship *"Dunkerque,"* which has an overall length of 702 ft. 9 in., and a main armament of eight 13 in. guns. **Price 9d. each**
(Made in the Meccano Factory in Paris)

GARAGE



Dinky Toys No. 45
Fitted with opening double doors. Will accommodate any two Dinky Toys Motor Cars.
Price **1/3** each

ROYAL TANK CORPS MEDIUM TANK SET

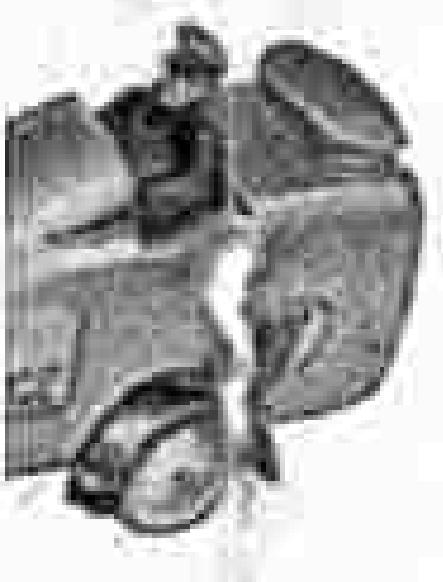
151a 151d 150d 151c 151b

Dinky Toys No. 151

No. 151a	Medium Tank (12 tons, 90 h.p.)	each	**1/6**
No. 151b	Three-ton Transport Wagon	"	**1/1**
No. 151c	Cooker Trailer with jack stand	each	**7d.**
No. 151d	Water Tank Trailer ...	"	**6d.**
No. 150d	Driver	"	**3d.**

Price of complete set **3/11**

TENDER



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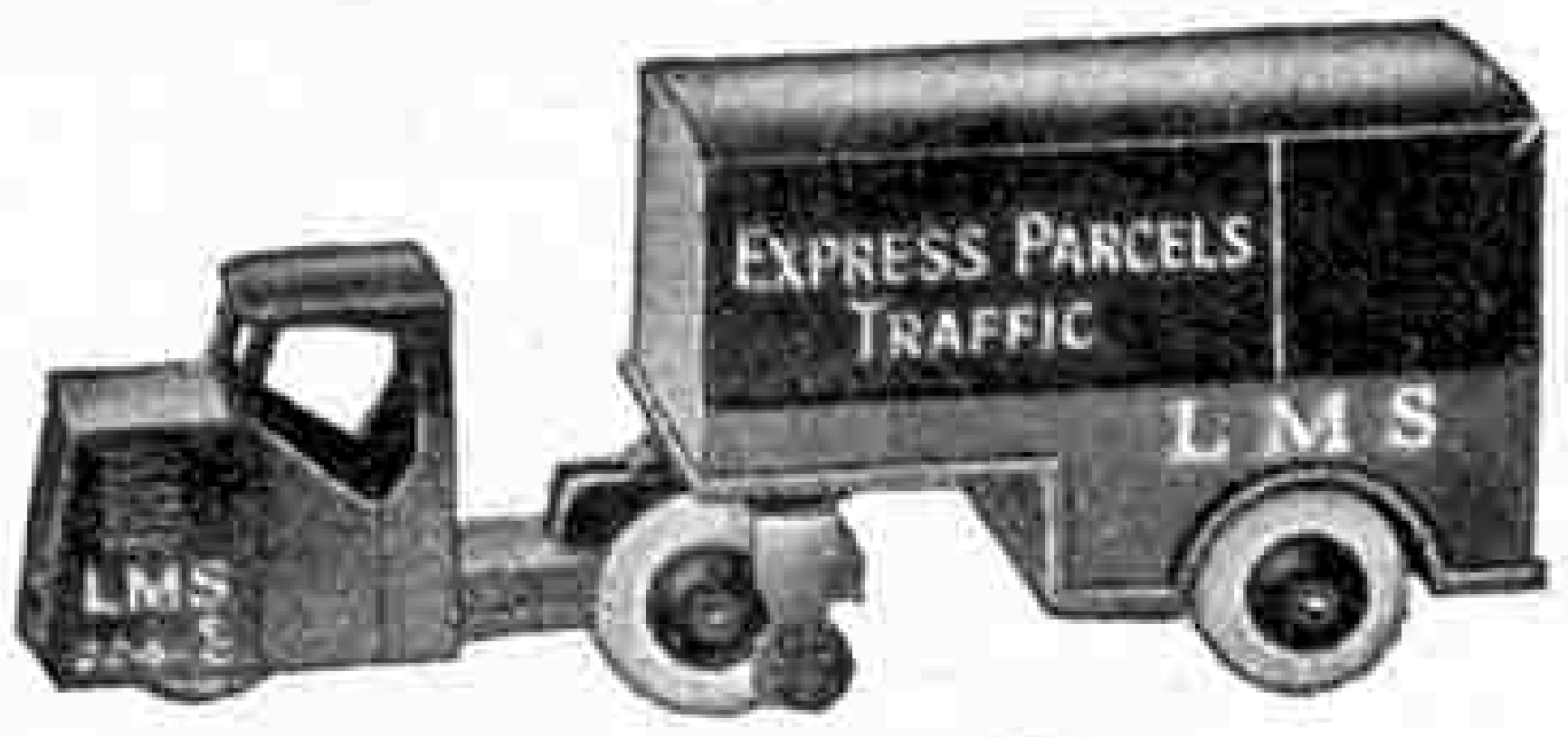
RAILWAY MECHANICAL HORSE AND TRAILER VAN



Dinky Toys No. 33R
Fitted with detachable rubber tyres.

No. 33Ra	Railway Mechanical Horse	each	**8d.**
No. 33Rd	Trailer Van	"	**10d.**

Price, complete, L.M.S.R., L.N.E.R., G.W.R. or S.R. ... **1/6**

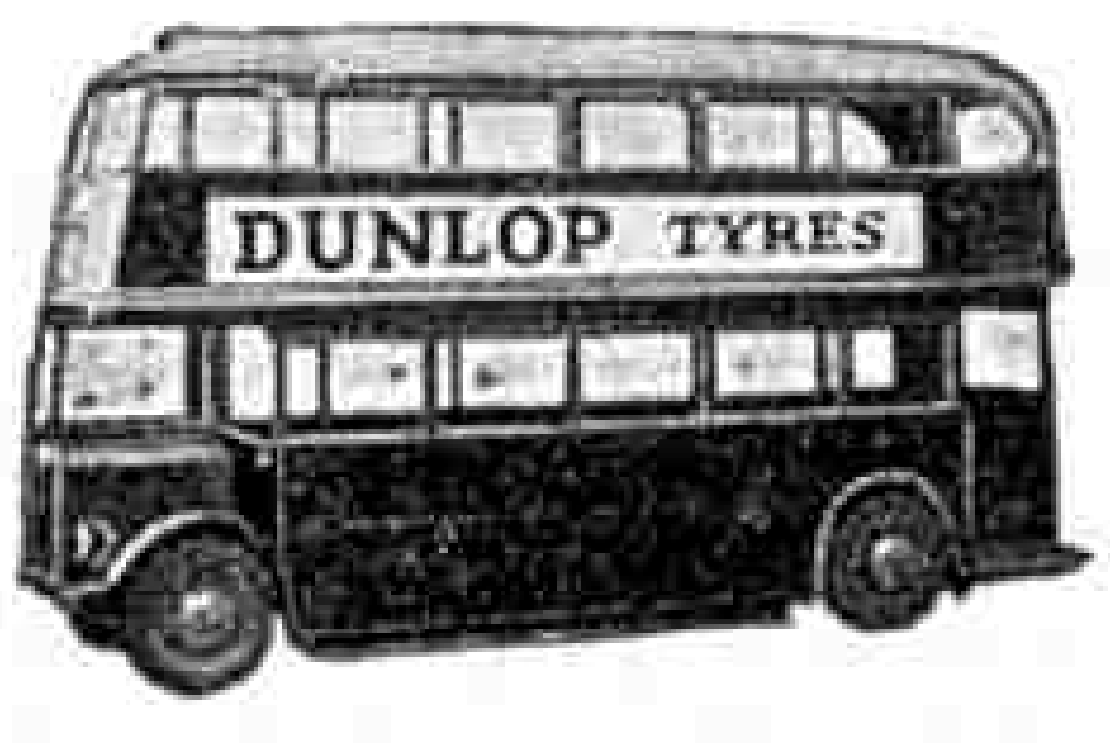
SIX WHEELED WAGON

Dinky Toys No. 25s
An interesting model of a modern three-ton wagon. In assorted colours.
Price **1/-** each

TAXI WITH DRIVER

Dinky Toys No. 36g
Fitted with detachable rubber tyres.
Price **11d.** each.

DOUBLE DECKER BUS

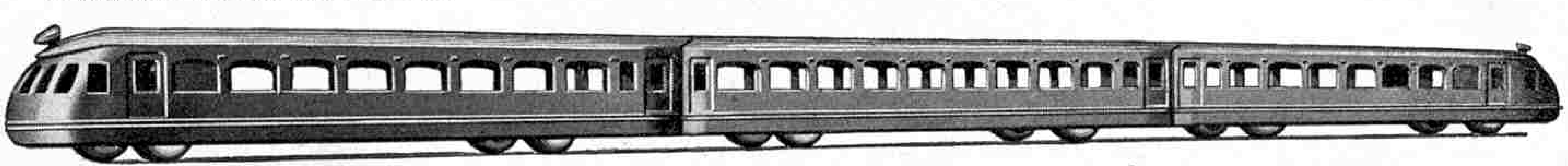


Dinky Toys No. 29c
Assorted colours. Fitted with detachable rubber tyres.
Price **1/-** each

**EE-WHEELED
LIVERY VAN**

y Toys No. 14z
with opening lid.
ce **10d.** each
the Meccano Factory
in Paris)

STREAMLINED DIESEL ARTICULATED TRAIN



Dinky Toys No. 16z Price **1/6** each (Made in the Meccano Factory in Paris)

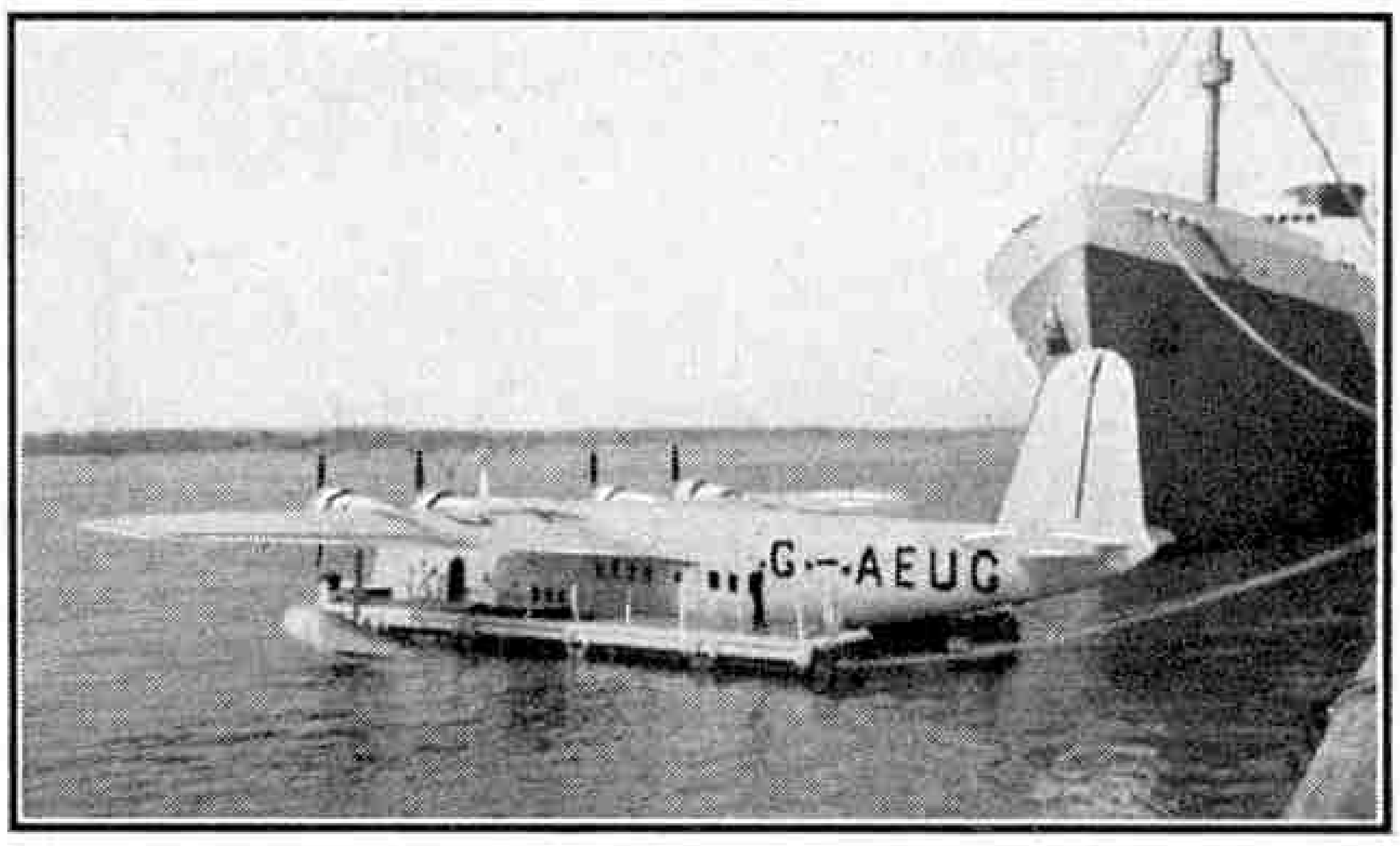
D., LIVERPOOL 13

FROM OUR READERS

These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

Empire Service Base at Hythe

Since Imperial Airways established a base for the Empire Services at Hythe, they have used a raft moored in Southampton Water for the disembarkation and embarkation of passengers on the flying boats. Since 4th April the raft has been moored off Berth No. 101 in the Docks Extension at Southampton Docks. The water here is more sheltered than the former position at Berth No. 50 in the old docks.



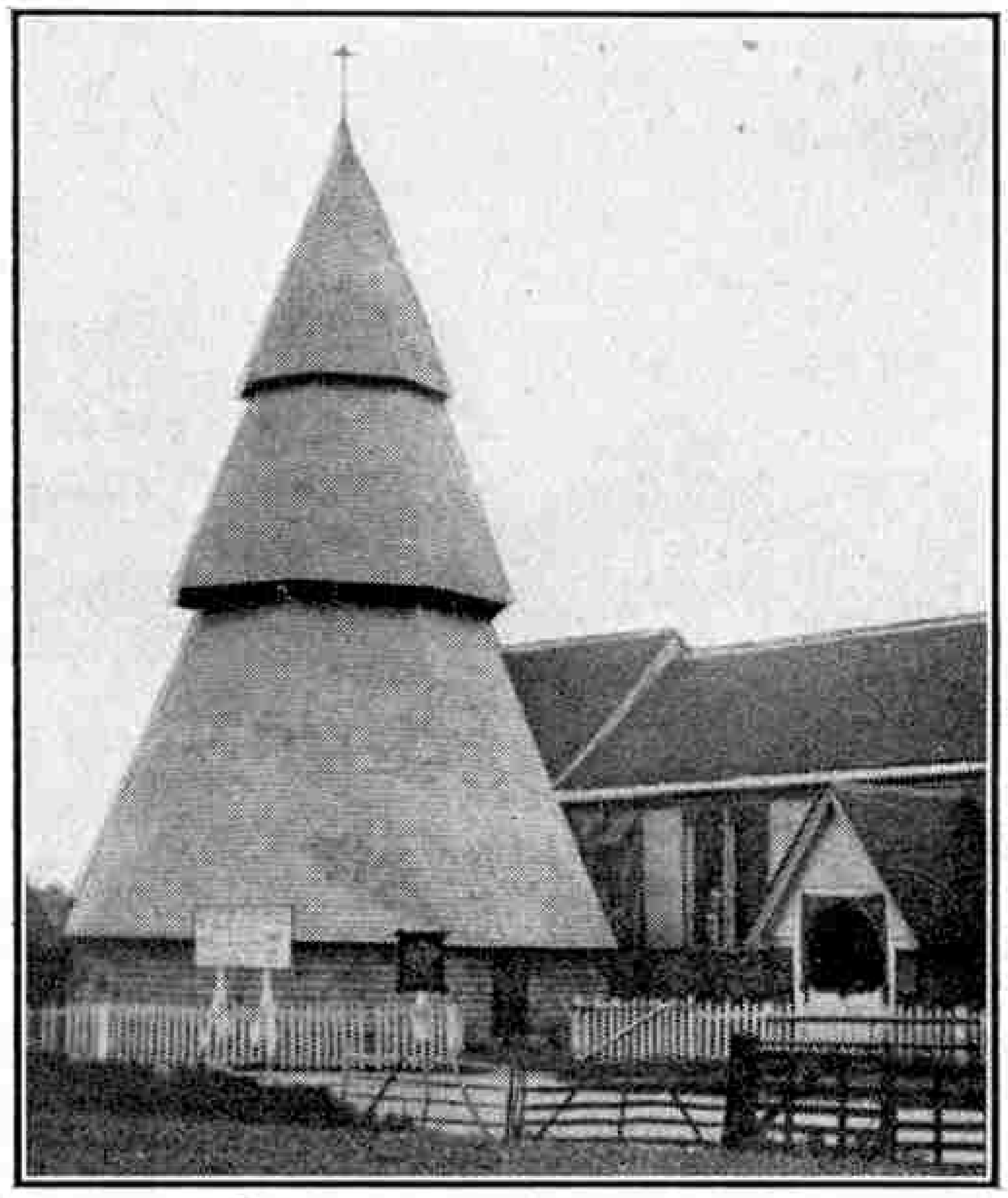
The Imperial Airways raft at Hythe on which passengers are landed from Empire flying boats. A floating gangway now connects the raft with the quay wall. Photograph by G. Hughes, Southampton.

Facilities for Customs and immigration formalities have been provided in the transit shed erected on the quay. Imperial Airways are moving their offices to the transit shed, and passengers can arrive or depart by a special train running into it. For a short time after the placing of the raft in the new docks passengers were conveyed between it and the quay wall by a motor launch. Later a pontoon gangway was provided, and passengers now walk along this.

G. Hughes (Southampton).

A Curious Bell Tower

The curious octagonal bell tower shown in the lower illustration on this page stands beside Brookland Church, in Kent. It is shaped like an old-fashioned candle-extinguisher and is roofed with wooden tiles or "shingles." The real reason for the use of this separate wooden structure is that the ground is too marshy to carry the weight of a normal stone tower with bells in it. Local tradition, however, has it that the original tower attached to the church was taken away by the devil!



An unusual bell tower at Brookland, in Kent. Photograph by J. D. U. Ward, Oxford.

There is a similar devil story told about the church at East Bergholt, the Suffolk parish famed for its associations with the painter Constable. It is said that the devil carried off the upper part of the original bell tower, and the present low bell-shed was erected so that his satanic majesty might not again be tempted to theft or destruction.

J. D. U. Ward (Oxford).

Kite-Fighting in Trinidad

Kite-fighting is now the craze in Trinidad. In the afternoon when it is cool and there is a steady wind the sky is dotted with kites of different colours and sizes. The kites are made of thin paper fastened on to a frame consisting of the middle rib of a leaf of the coconut palm. For kite-fighting razor blades are fastened on to the tail of the kite.

The kite-fighter requires great skill, and must know all the tactics that may enable him to get the upper hand. He must know how to put his kite into any position quickly, either in attack or defence.

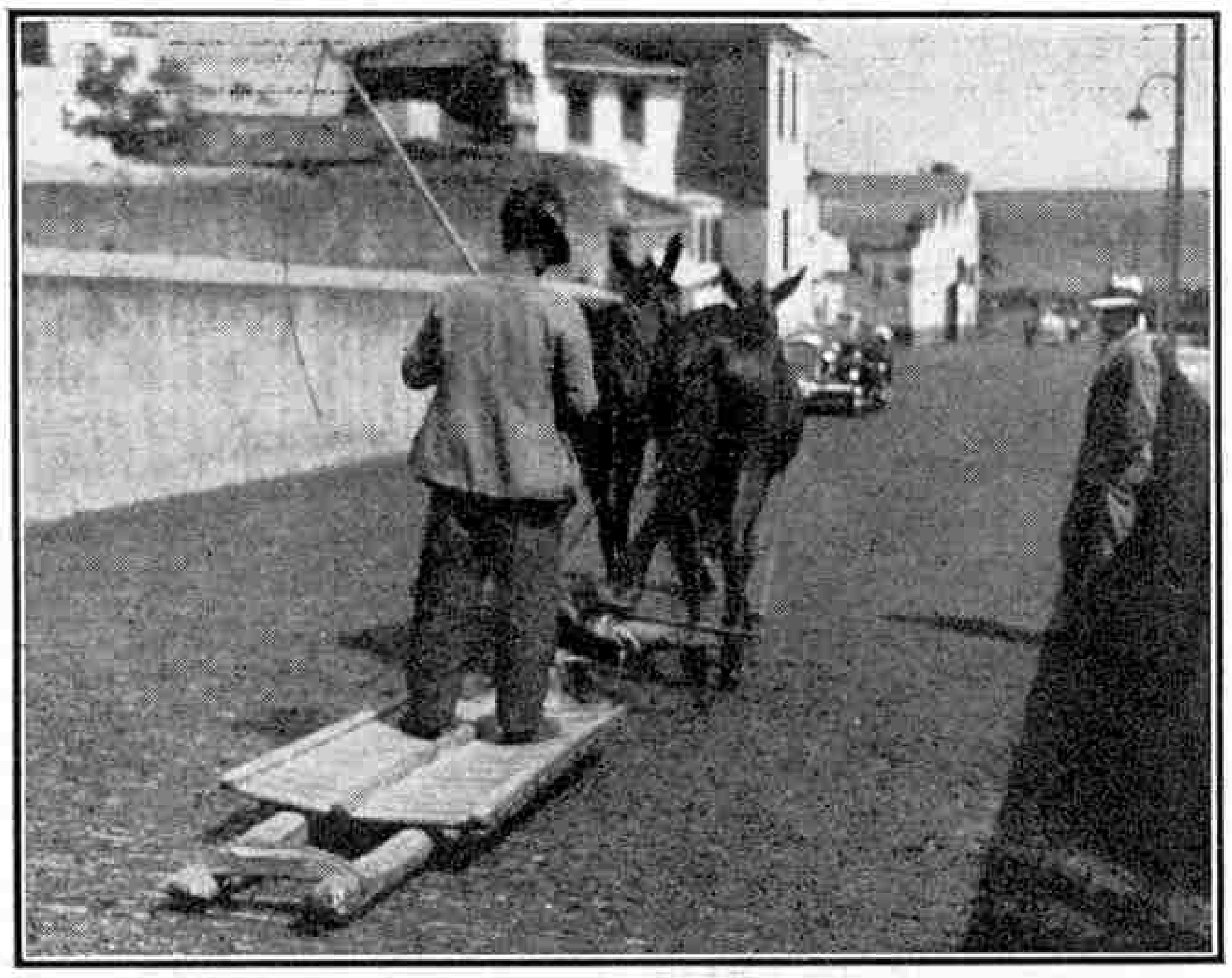
The kites dart about following each other. When one succeeds in getting above another, the flyer swoops it down so that the tail is over his opponent's cord. Then he gives his kite a sudden pull, and the razor blades in the tail do the rest. If a kite is cut down, it becomes the property of the first one to find it. Though the kites and the flyers may be three hundred yards apart, they regulate their charges with ease in this novel fight.

Kite-flying may seem a strange pastime to those living in Europe, where kites usually are flown only by children and are regarded as a toy; but in some parts of the world, particularly in the East, it is as popular a pastime as are cricket and football in England. The Chinese, Japanese and Koreans fly giant beautifully-coloured kites representing dragons, birds and other creatures during their frequent celebrations and feasts, and in China "Kites Day," the ninth day of the ninth month, is a great holiday.

H. Reid (Trinidad, B.W.I.).

Transport in Madeira

During a cruising holiday I spent a very interesting day at Funchal, in Madeira. Most of the streets of the town are very narrow and paved with small cobble stones. I had read of the bullock sledges used there, and thought that a few of these were retained simply as an attraction for visitors, but I was very much mistaken. Although there are of course many motor cars, the bullock or mule drawn sledge is still a common form of transport, and the way it travels about the streets is amazing. The cobbled surface has been worn smooth and shiny with constant use, and the sledges glide along very much like ice toboggans. When rounding sharp corners, the animals are driven into the turning, and the rear end of the load is pushed round until it is in line.



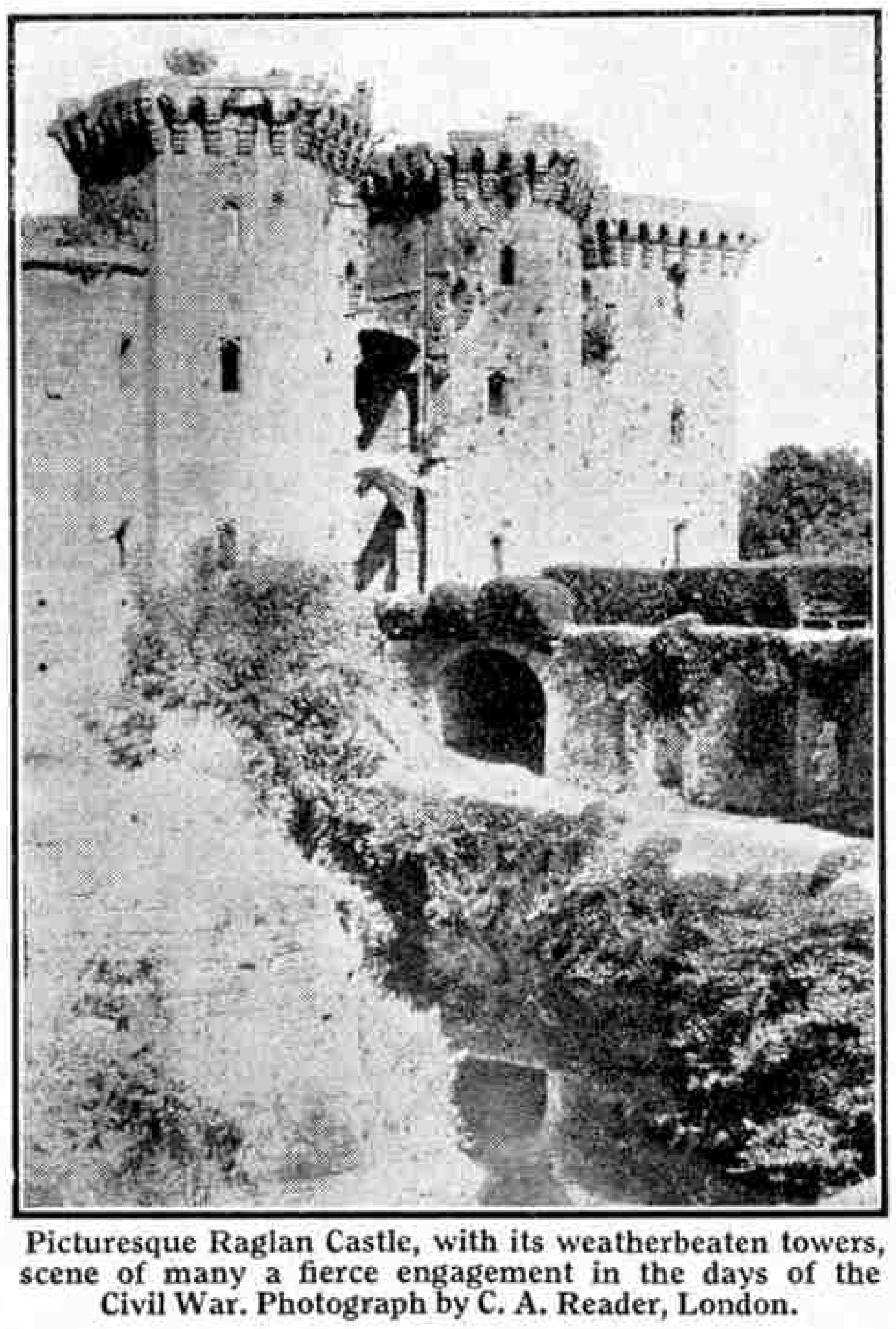
This primitive form of transport is still widely used in Funchal, Madeira. The metal runners of the "sledge" glide smoothly over the surface of the road. Photograph by T. Brooks, Halifax.

The chassis of the sledge consists of two long wooden poles shod with steel bands running the full length underneath, turned up at the ends and bent over to protect the pole ends. A platform fastened across the two poles carries the load, usually sugar cane or other farm produce. For carrying barrels of the famous Madeira wine the platform is removed, the barrels resting on the two poles. If friction causes the steel runners to become too hot, the driver lays a bag of grease on the ground and allows first one and then the other runner to pass over it.

T. Brooks (Halifax).

Raglan Castle

Raglan Castle, near Monmouth, has many points of interest, as I found on a recent visit. It makes a grand sight, with its imposing towers, topped by a remarkable parapet having apertures through which olden-time defenders poured molten lead and boiling water on to the besiegers. The castle is surrounded by an attractive flowery-banked moat and superb lawns. A grim reminder of the Civil War is a yawning breach in the east wall made by the guns of the Roundheads, who eventually captured the castle and dismantled it on the order of their leader, Cromwell.



Picturesque Raglan Castle, with its weatherbeaten towers, scene of many a fierce engagement in the days of the Civil War. Photograph by C. A. Reader, London.

The keep is still in good condition, and from its top I had a fine view. East I could see beyond Monmouth to the Kymin, south to the Bristol Channel, and west to the great hills, including the Sugarloaf, around Abergavenny. The castle was the home of the Marquis of Worcester, the famous 16th century inventor, and in the walls of the keep are grooves and cells believed to have accommodated a steam engine he devised for raising water..

C. A. Reader (London).

The Cromford and High Peak Railway

I recently had the opportunity to walk along the entire length of the Cromford and High Peak Railway, which comprises a single track running from Parsley Hay, on the Buxton-Ashbourne branch of the L.M.S., to Cromford, on the main L.M.S. ex-Midland line running through Matlock.

From Parsley Hay station the line bears away to the left from the Ashbourne line, and soon passes through a short tunnel; then along a low embankment to Friden yard, where there is a passing loop and also two sidings. The line continues through exposed country, passes a level crossing, and then at Gotham comes the sharpest curve on the line, of only 165 ft. radius.

The line continues through a narrow cutting with vertical rock walls and a clearance on each side of only about six inches. Soon it comes to Longcliffe yard, which consists of a passing loop and three sidings, together with an inclined spur on which converted tenders are used as water tanks for the village water supply, there being no other supply available. This water has to be brought about 3 miles. I was very amused to see the Longcliffe station master arrayed in his magnificent gold-braided cap. The next part of the line is still in exposed country, with brick kilns and other works dotted about. There are occasional deep cuttings until the line arrives at the top of the Hopton incline, on which there is a maximum gradient of 1 in 14, probably the steepest adhesion-worked incline in the country.

From the bottom of the incline there is a line to a large quarry about half-a-mile away. Immediately beyond the junction of these two lines there is a tunnel about 250 yards long, which is partially unlined and partially lined with wooden planks held together by old lengths of rail. The next yard is at Middleton, at the head of one of the wire-rope inclines. There are two of these, each worked by a continuous wire cable from a winding engine at the top, the cable running between the rails and being attached to the wagons, drawing them up or letting them down the gradient. Both on this and on the Sheep Pasture incline encountered later the steepest gradient is 1 in 8. The line runs into Cromford, over the Canal, and finally joins the former Midland Railway at High Peak Junction.

Except for the section of the line from Parsley Hay to Friden, which is worked by 0-6-0 tender locomotives, the line is worked throughout by ex-North London Railway 0-6-0 tanks.

A. Lines (Manchester).

Locomotive History in Meccano

Fine Models Built by an "M.M." Reader

LOCOMOTIVE progress on one of the busiest lines in the country is illustrated in a remarkably accurate manner by the fine model locomotives constructed from Meccano parts that are shown on this and the opposite page. The line referred to is the Tilbury section of the L.M.S., which was described in an article in the "*M.M.*" last April. This was once the independent London, Tilbury and Southend Railway but it was taken over by the former Midland Railway in 1912. The models cover the period from the old independent days, through the intermediate stage of Midland ownership up to the present time, and were built by J. Nowlan, St. Pauls Cray, who was awarded a prize for them in a recent "*M.M.*" model-building competition.

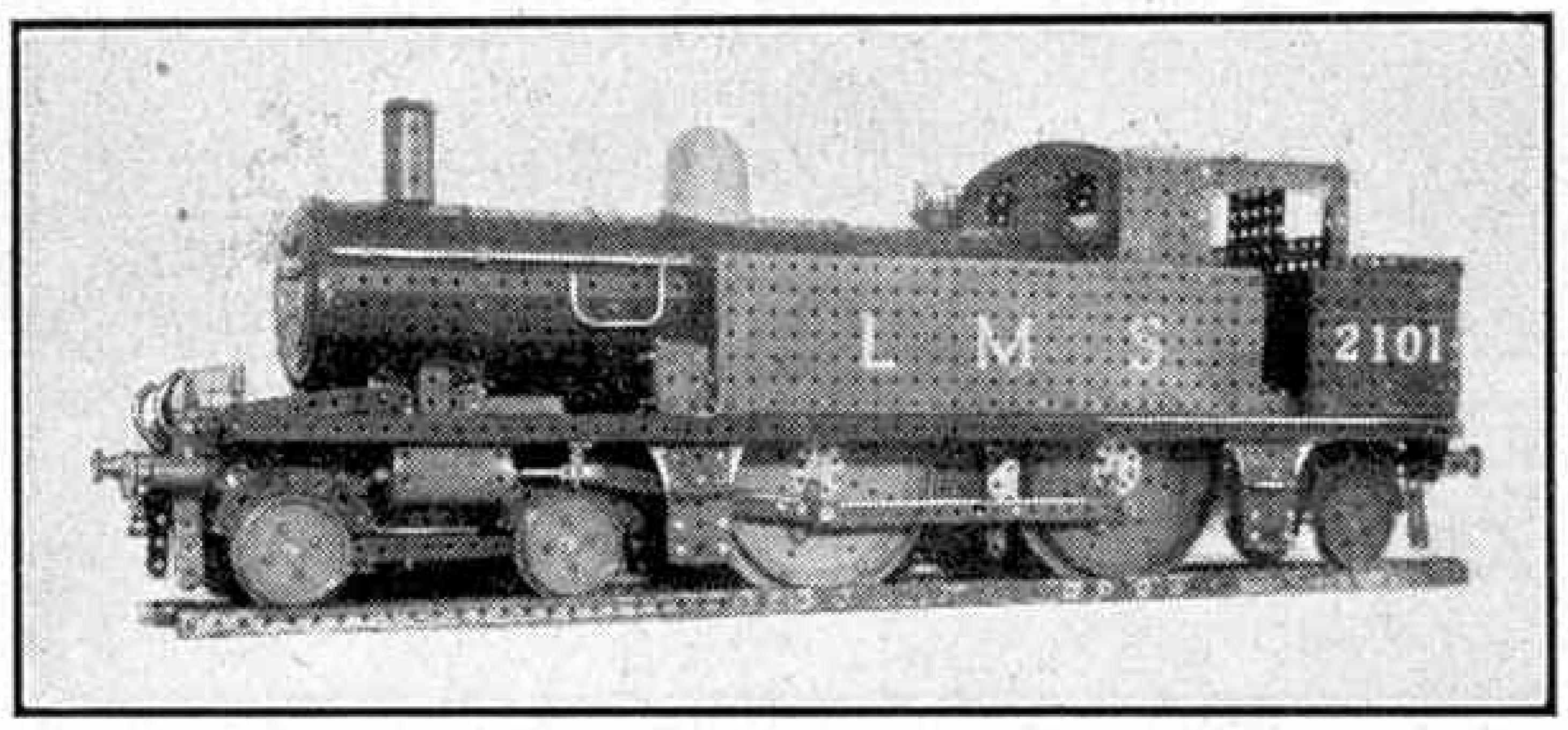


Fig. 1. A fine model of L.M.S. 4-4-2 tank locomotive No. 2101 used on the former London, Tilbury and Southend Railway. The models shown in the illustrations on this page were built by J. Nowlan, St. Pauls Cray.

Certain definite characteristics marked the locomotive practice of the London, Tilbury and Southend Railway. Most of these have persisted to a certain extent until the present day, at least as far as locomotives of true "Tilbury" design are concerned. The regular traffic of the line, which is very intense, has long been worked solely by tank engines, and for passenger trains the 4–4–2 type has until recently been used almost exclusively. In details, however, there was a very strong traditional touch about "Tilbury" designs. This is not surprising, since from 1880 until 1912 the locomotive department was managed by two men only, and these were father and son, T. Whitelegg and R. H. Whitelegg respectively. These features are exceedingly well reproduced in the models and serve to show how the individuality of the originals has been preserved, except for various modifications due to Midland Railway influence, such as the provision of extended smoke-boxes and the fitting of the narrow chimneys that were standard on the latter railway.

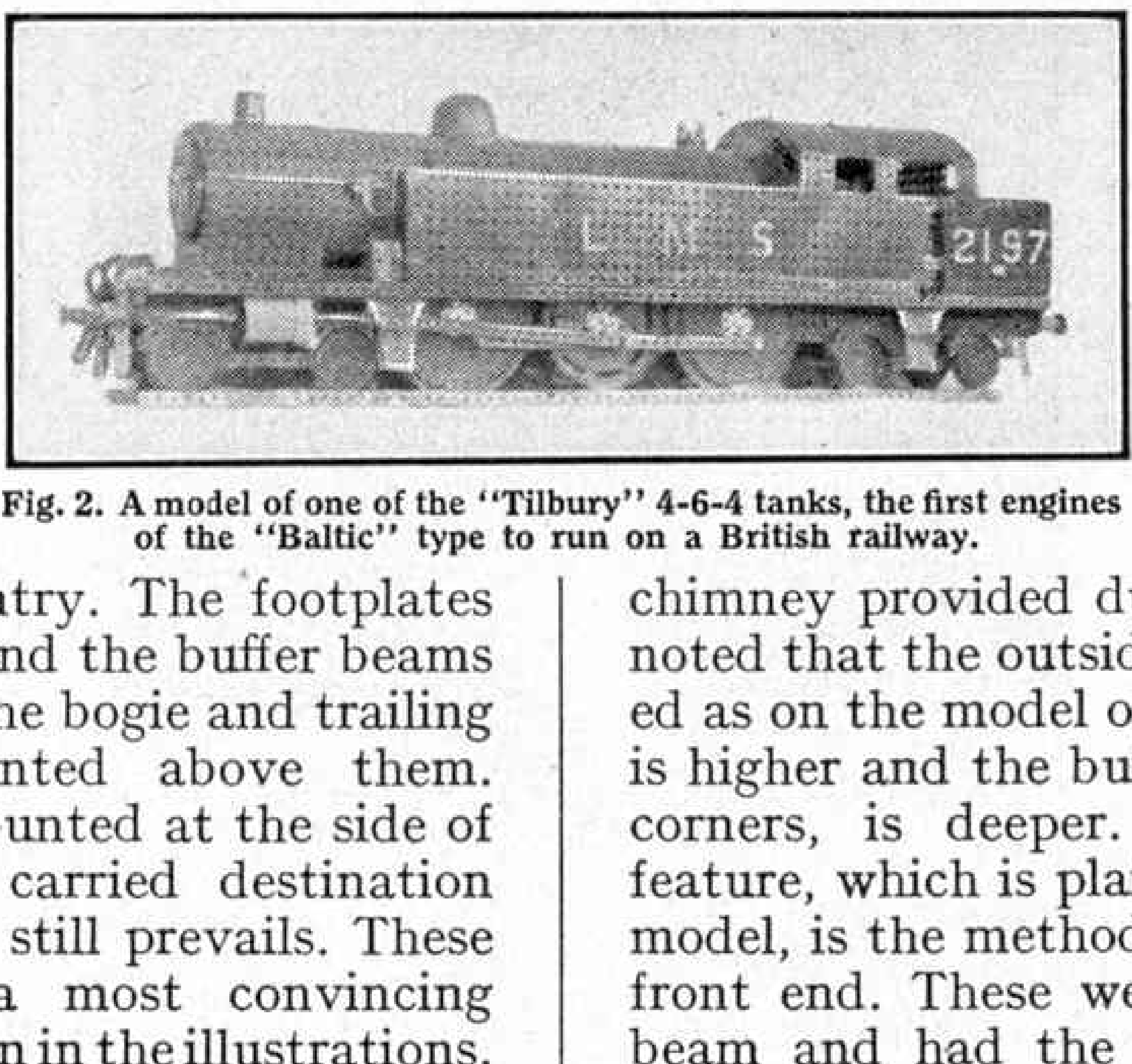


Fig. 2. A model of one of the "Tilbury" 4-6-4 tanks, the first engines of the "Baltic" type to run on a British railway.

All the "Tilbury" 4–4–2 tanks had outside cylinders, mounted horizontally, with single-slidebar crossheads. Outside steam pipes too were employed at a time when such fittings were rare in this country. The footplates were straight and had deep edging and the buffer beams were cut well away at the corners. The bogie and trailing wheels had small splashers mounted above them. Westinghouse brake pumps were mounted at the side of the smoke-box, and each engine carried destination boards fore and aft, a practice that still prevails. These characteristics are reproduced in a most convincing manner in the "Tilbury" models shown in the illustrations.

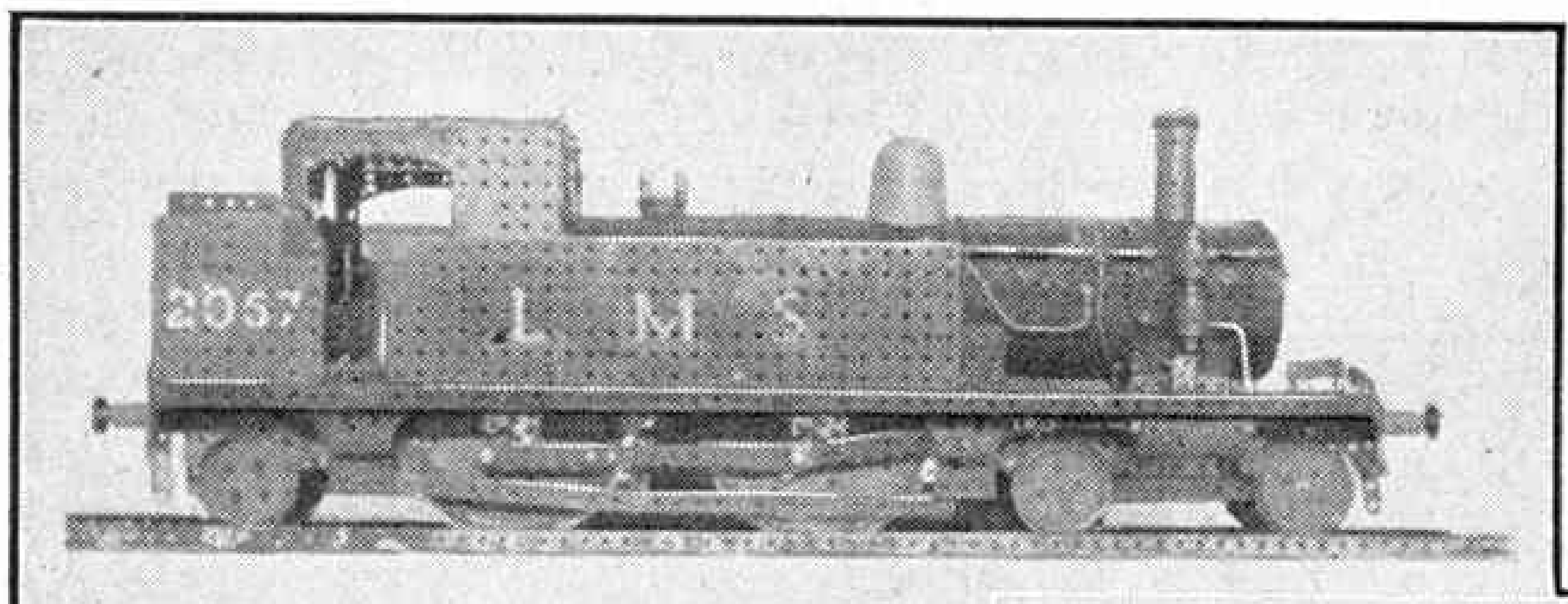
The Whitelegg 4–4–2 design may be said to have run to three editions, each of which is represented by one of the models described on these pages. There were the original small-boilered engines, an intermediate series with generally enlarged dimensions, and a large-boilered design. The earliest of the small-boilered class appeared in 1880, and 36 in all were built between then and 1892. These, with an enlarged class that appeared in 1897, did all the work, both goods and passenger, no special goods engines appearing until 1899. A very good representation of one of the older engines of this series in its most recent state is shown in Fig. 3. This is a model of L.M.S. No. 2057, which was No. 2136 in Midland days; earlier still, as a "Tilbury" engine, it was No. 27 and bore the name "*Whitechapel*," for at one time all the "Tilbury" tanks carried names of places or districts of significance on the line.

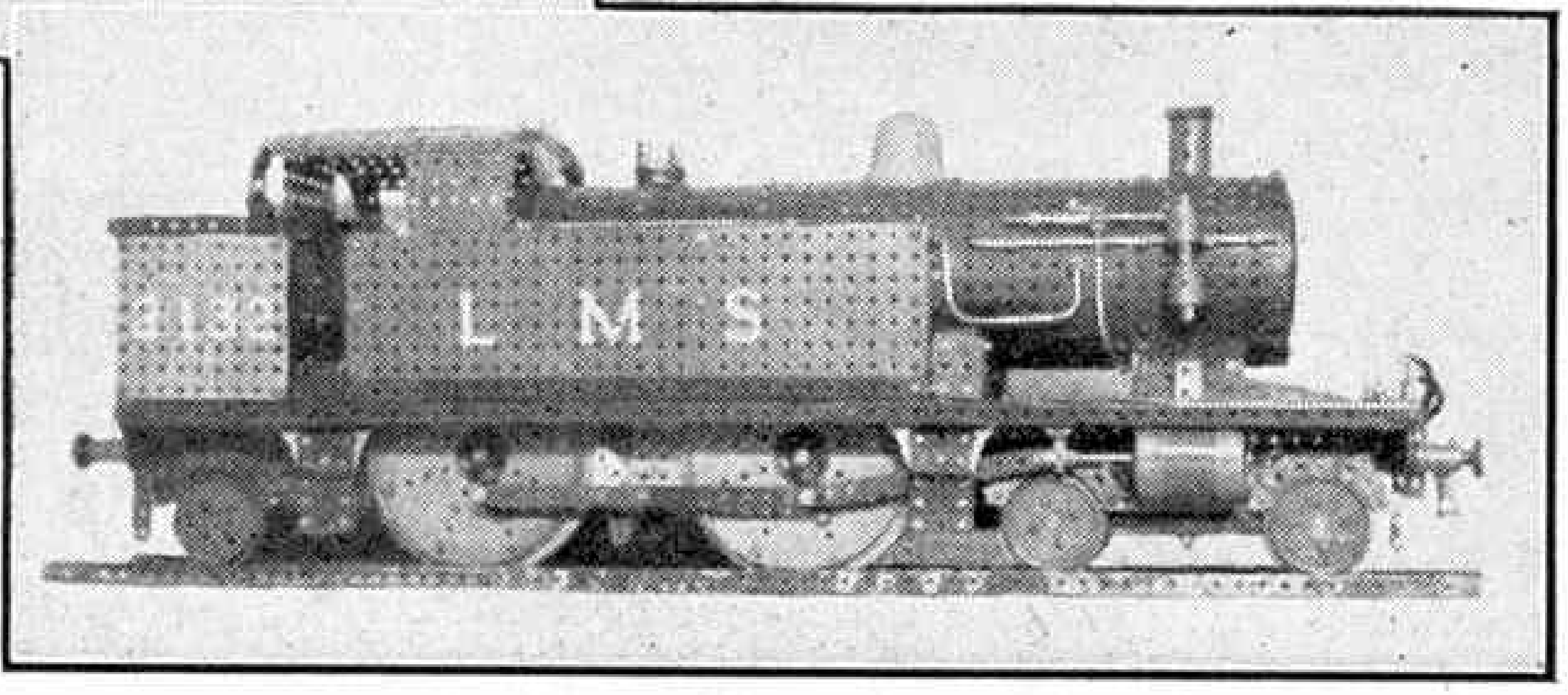
"*Whitechapel*" was built in 1884, so that the model has the small boiler characteristic of the period. Its general "slimness" is accentuated by the height of the chimney and the dome. The narrow chimney, admirably represented by Meccano Chimney Pieces capped with a Pulley, and the extended smoke-box, which were characteristic additions of the Midland period, somewhat spoiled the handsome lines of the original design. The horizontal cylinders, partly concealed by the deep footplate edging, and the wide spread of the bogie wheels are typical features that have endured on "Tilbury" 4–4–2s until to-day. The Westinghouse brake pump mounted at the side of the smoke-box is an interesting fitting that was once more common in actual practice than is the case to-day, owing to the adoption of the vacuum brake as a general standard.

The next development of the type is seen in Fig. 1, which shows a model of L.M.S. No. 2101. This has a larger boiler and coal bunker. No. 2101 carried the Midland number 2167, but in Tilbury days was No. 60 and bore the name "*Highgate Road.*" The model represents the intermediate stage in the development of the Tilbury 4–4–2 tanks and, like No. 2057, it is shown with the extended smoke-box and characteristic chimney provided during the Midland period. It will be noted that the outside cylinders are not so much concealed as on the model of the earlier engine, for the footplate is higher and the buffer beam, with its typical cut-away corners, is deeper. A very characteristic "Tilbury" feature, which is plainly visible in the illustration of this model, is the method of mounting the guard irons at the front end. These were always fitted outside the buffer beam and had the appearance of being extensions of the main frames.

The final expression of the "Tilbury" 4–4–2 type is shown by the model of L.M.S. No. 2132. This represents one of the engines constructed since the formation of the

L.M.S. specially for work on the Tilbury line. In all its essential features the design followed the latest development of the 4–4–2 of the "Tilbury" period. It is a remarkable tribute to the soundness of the type and its suitability for the work that 35 engines of this essentially "Tilbury" design were constructed for use on that section between 1923 and 1930; that is even after the parent system had seen some 10 years of Midland ownership and had subsequently been absorbed into the L.M.S. group. No. 2132, the subject of the model shown in Fig. 4, on this page, is one of a batch of five built at Derby in 1927.





Figs. 3 and 4. The upper illustration shows a model of an early "Tilbury" 4-4-2 tank, and the engine in the lower illustration represents the final development of the type.

This large-boilered type of 4–4–2 originated on the Tilbury line in 1909 with No. 79 "*Rippleside*," which became M.R. No. 2176 and is now L.M.S. No. 2109. Apart from the sound work that these engines have always done, the adherence to this type with various modifications was no doubt due to the relatively unsuccessful results obtained from the class of "Baltic" tanks illustrated by the model of L.M.S. No. 2197 shown in Fig. 2. These were the first "Baltics" in the country and, although they represented a vast enlargement in type as compared with the 4–4–2s that they were to supersede, they still conformed to "Tilbury" traditions in many of their details. These giants actually appeared after the Midland Railway had taken over the Tilbury line in 1912, so that they carried Midland numbers and had no names.

There were originally eight of these engines, Nos. 2100 to 2107, but after grouping they were renumbered. No. 2197, the subject of the model, was originally No. 2105. As a small class of locomotives they were doomed to early extinction under the L.M.S. standardisation programme, but they had in any case a more or less unfortunate history. In the first place they were too heavy to be allowed to work into Fenchurch Street, the London terminus used by the "Tilbury" trains, and they were even employed during the War period in working on Midland coal trains between Cricklewood and Wellingborough! Later some of them at least had a spell of suburban work in and out of St. Pancras, but the class never seemed to settle to any particular duties and none of these engines is now in existence.

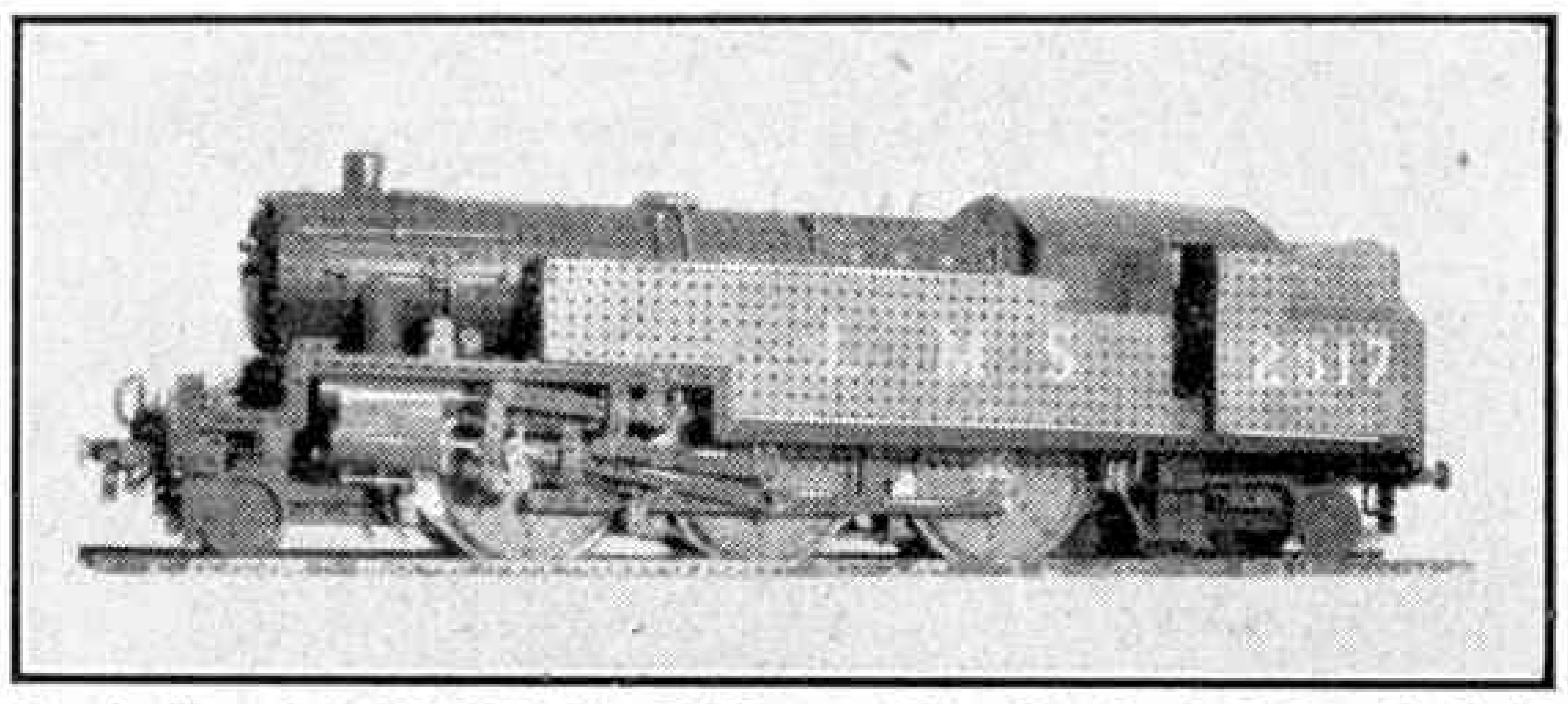


Fig. 5. A model of L.M.S. No. 2517, one of the Stanier 2-6-4 tanks built with three cylinders specially for "Tilbury" service.

In addition to being the first "Baltics" in Britain, these engines were interesting in a sense in being the forerunners of the even larger "Baltics" produced by the same designer, R. H. Whitelegg, for another system which, although far away from the Tilbury line, now forms part of the L.M.S. This was the Glasgow and South Western Railway, for which several giant "Baltics" were built in 1922, but they also have followed their older "Tilbury" relatives to the scrap-heap.

The most recent phase of locomotive development on Tilbury metals is shown by the model of L.M.S. No. 2517. This represents one of the Stanier 2–6–4 tanks specially built with three cylinders to obtain the quick acceleration needed on the intensive services on the Tilbury line. These engines total 37 in number and are sometimes referred to in their particular territory as "Tug-boat Annies," their characteristic hooters closely resembling the sirens of the tugs on London River nearby. These engines present a remarkable contrast to the relative simplicity of the traditional "Tilbury" types. The wheel arrangement in itself is novel, as is the arrangement of the footplate, which is raised to clear the outside valve motion. The tapered boiler with its Belpaire fire-box is different from anything previously seen on the Tilbury line and the special type of coal bunker also is a novelty, the upper part being set in at the sides in order to provide a clear lookout for the crew when the engine is travelling backward. This is an important point on a tank engine that is likely to spend half its life working trains bunker first.

The accuracy with which these various stages in the development of the "Tilbury" locomotives are demonstrated by the models shown in the accompanying illustrations is due largely to the builder's familiarity with the possibilities of Meccano parts. Study of the illustrations will reveal many novel constructional features that will not fail to interest all Meccano users. All the models are built to a scale of $\frac{7}{8}$ in. to 1 ft., and are designed so that they can be set in motion by means of a Meccano Electric Motor. The reversing switch of the Motor is connected to a lever inside the cab, and the control handle of the Transformer that supplies current to the Motor is linked up with the regulator handle so that the working speed of the model can be varied.

A standard type of construction is used for the boilers and cabs of all the models, Strips and Flat Plates being used freely to obtain the desired effect. In the locomotives illustrated in Figs. 2 and 3 the method of streamlining the smoke-box saddle into the "barrel" part is particularly pleasing, as also is the construction of the outside steampipes in the model of locomotive No. 2517. The pipes are built up from Flexible Plates curved to shape with their plain sides outwards, and fastened to the smoke-box by Strips.

The forward end of each locomotive is reproduced in full detail. For the buffers Sleeve Pieces fitted with 1 in. Pulleys are used, and the train pipes are represented by Springs mounted on vertical Rods.

The cylinders of the locomotives vary more than any other feature. In the two earlier types they are represented by Flexible Plates fastened around Flanged Wheels, while in the third and fourth of the series Boiler Ends are used as the shaping pieces. The cylinder units of the modern engine are formed with 2½″ Cylinders and Sleeve Pieces.

In Search of New Models

Train Ferries—Early Locomotives—Workshop Tools

THE four fine models reproduced on this and the opposite page represent subjects of greatly different types, and are particularly well suited to illustrate the wide range that can be explored by readers in search of new models.

Readers who like building model ships will be attracted by the reproduction of the Dover-Dunkerque train ferry *"Twickenham Ferry,"* shown in Fig. 1. This ship, together with the service upon which it operates, was described fully in the issues of the *"M.M."* for March and April 1937, and by comparing the model with the illustrations given in these two articles, readers will see that an extremely realistic appearance has been obtained. An unusual feature of the *"Twickenham Ferry"* is that the two narrow funnels are mounted abreast instead of one behind the other. This arrangement is used so that a clear space is left down the centre of the hull for the trains, and it gives an extremely distinctive appearance to the ship.

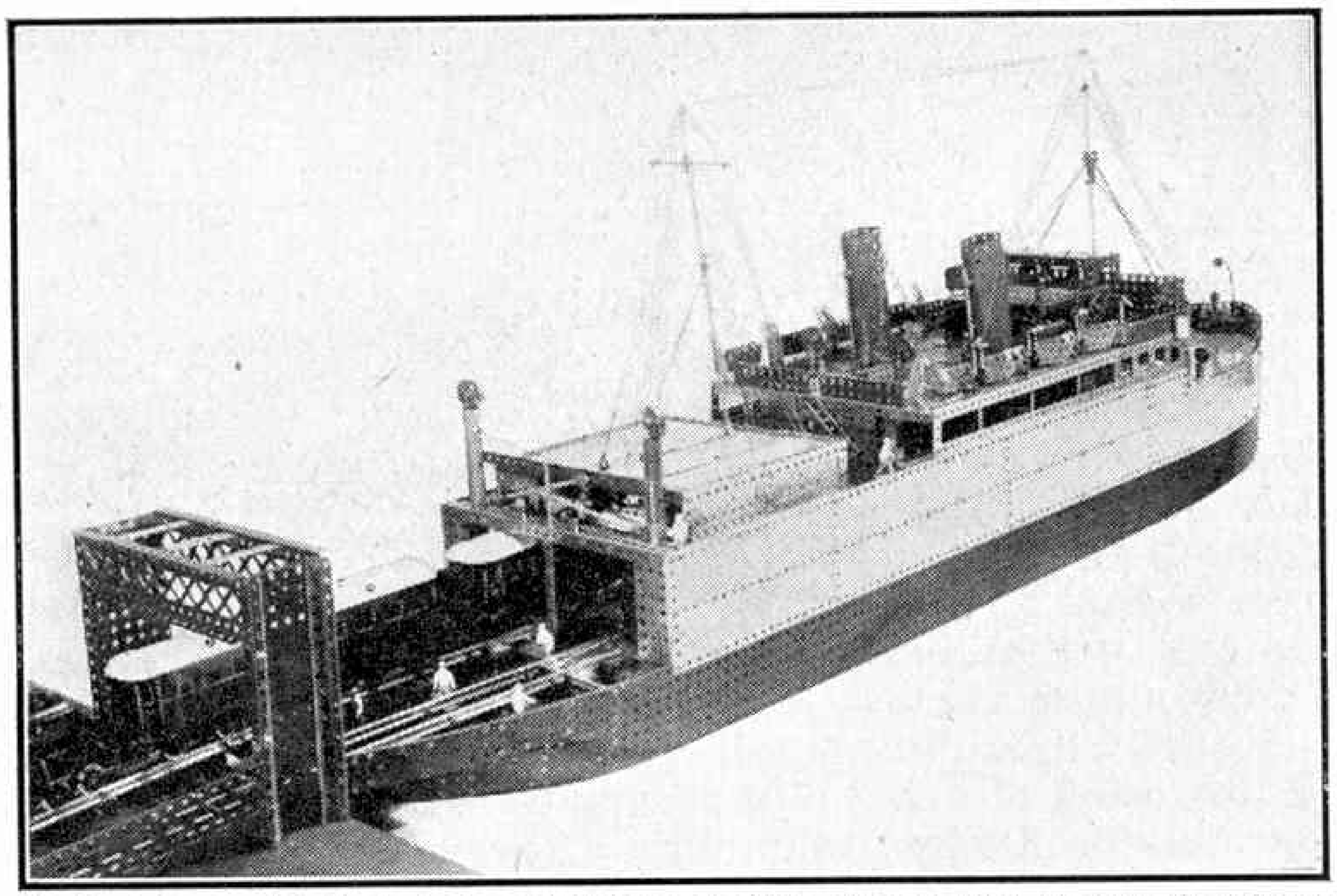


Fig. 1. A fine model of a train ferry built by Pablo Giese, Buenos Aires. Owners of the larger Outfits will enjoy designing and building models of this type.

The reproduction of an unusual vessel of this kind allows the model-builder plenty of scope for experiment in design. In the model illustrated the hull is built mainly from Flat Plates and Strip Plates, and it should be noted that the latter are placed with their plain sides outermost, the result being a very pleasing appearance. There are two decks, the lower one accommodating trains, while the upper one is reserved for motor cars and passengers. The train deck is fitted with four sets of Hornby rails, which converge into two tracks at the stern, and on the upper deck a large garage and cabins are provided. The Hornby Train and Dinky Toys motor cars and figures, which suit the scale of the model admirably, add a final touch of realism.

When building a model such as this it is interesting to fit it with a device to make it roll, or rock from side to side, in imitation of a real ship at sea. It is easy to arrange this by mounting the model on Eccentrics fitted on axles driven by a motor inside the hull. If the model is mounted on a baseboard an alternative method is to pivot the ship on a Rod at its centre, and impart movement to the Rod by means of an Electric Motor and cam. Blue or green cloth is then draped over the baseboard to represent waves, and arranged so that it conceals the bottom of the hull.

It is also a good plan when building a model train ferry to provide a quay to which the ship can tie up. Quays for train ferries are usually fitted with hinged bridge gangways, so that the operation of transferring the trains from ship to shore is not interfered with by the level of the water in the harbour. Some types of train ferries, however, notably those operating on Baltic Sea services, are provided with trimming tanks, so that they can accommodate themselves to the level of the rails on the quay.

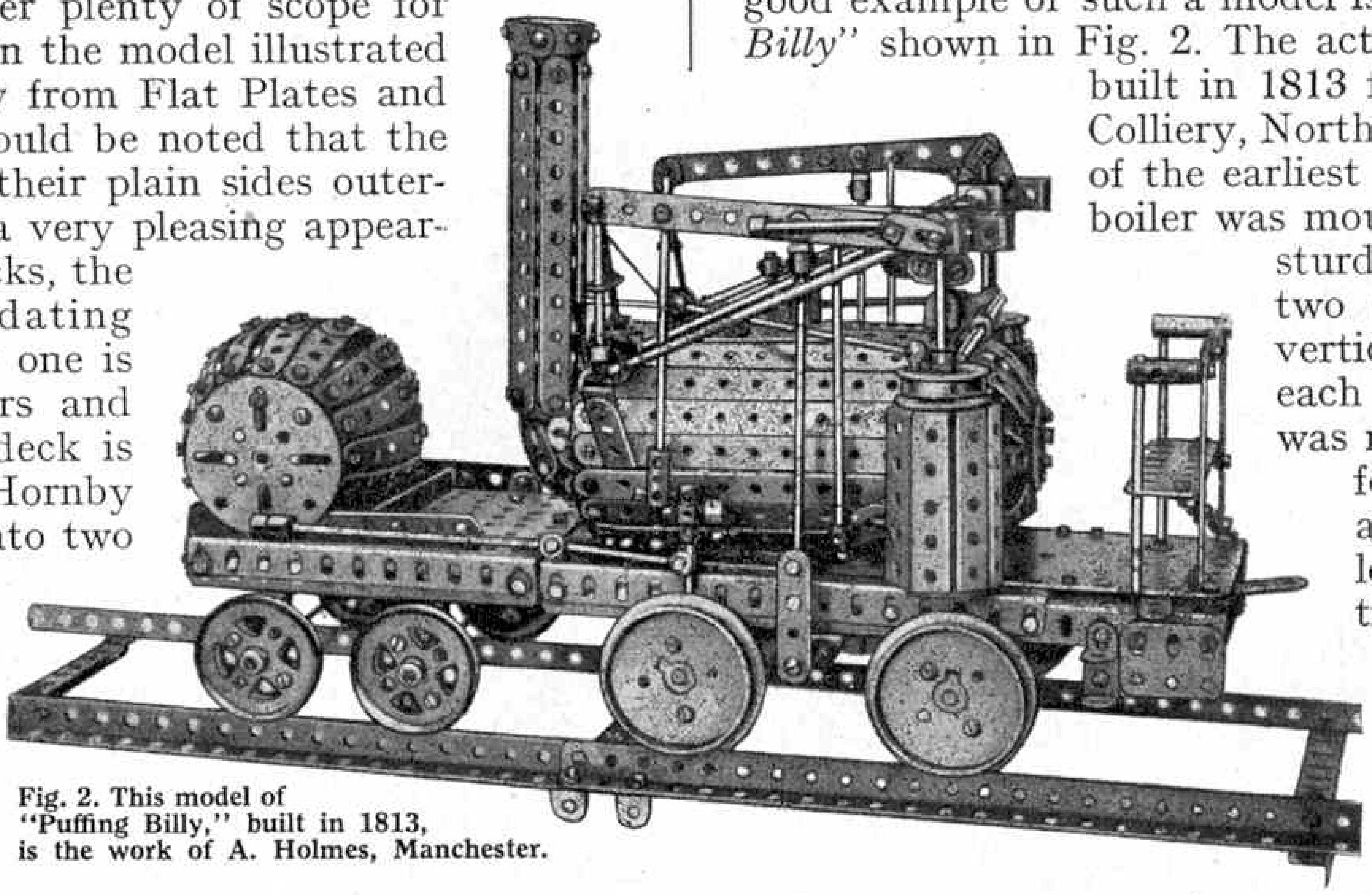


Fig. 2. This model of "Puffing Billy," built in 1813, is the work of A. Holmes, Manchester.

The reproduction of famous locomotives of former days would provide months of really interesting work for the keen model-builder, for practically every one of these has special features that make them very good subjects. A good example of such a model is the well-built *"Puffing Billy"* shown in Fig. 2. The actual *"Puffing Billy"* was built in 1813 for work at the Wylam Colliery, Northumberland, and was one of the earliest steam locomotives. The boiler was mounted at the centre of a sturdy main frame, and the two cylinders, which acted vertically, were fitted one on each side of it. A water tank was mounted at the extreme forward end of the frame, a feature that gave the locomotive a very distinctive appearance.

The main features of the prototype are well brought out in the model by the use of Strips, and a good representation of the actual piston and valve mechanism also is incorporated. The model is driven by a Clockwork Motor fitted between the sides of the chassis.

Other famous old locomotives that can be reproduced realistically in Meccano are Stephenson's *"Rocket"* and Ericsson's *"Novelty."* Several models of the *"Rocket"* have been illustrated in the *"M.M."* from time to time, so that most readers will be familiar with its main features and will have no difficulty in constructing a realistic model.

The *"Novelty"* was illustrated on page 147 of the March issue of the *"M.M.,"* and readers who refer to that illustration will see that its layout was very different to that of the *"Puffing Billy."* Angle Girders can be used for the chassis and Strips for the boiler, and there should be no difficulty in reproducing the piston and valve mechanisms. The best method of constructing the cranked rear axle of the *"Novelty"* is to connect two Crankshafts (Part No. 134), but if desired it can be built from Couplings and short Rods.

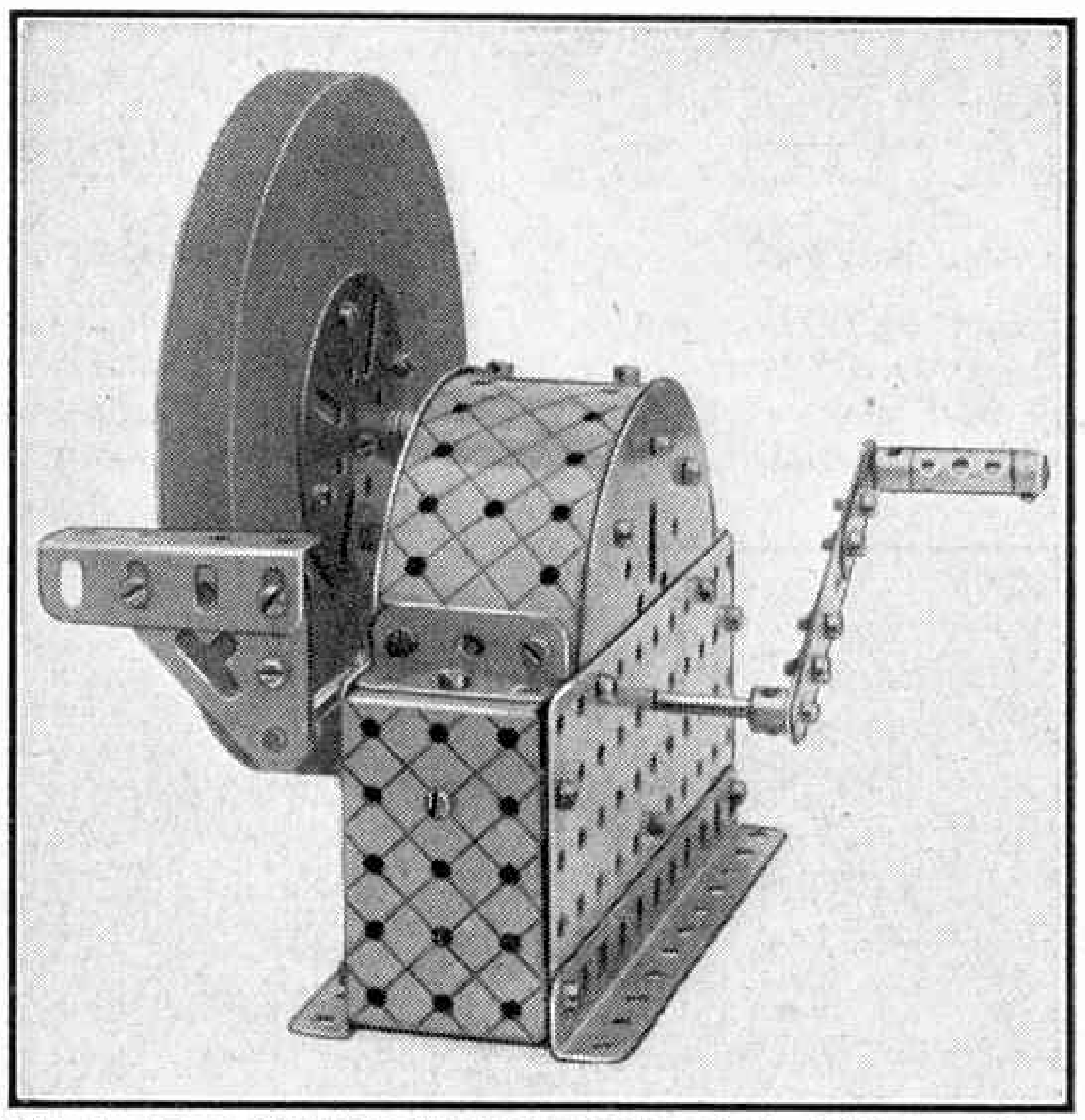


Fig. 3. An easily-built grinding machine that will be useful to amateur woodworkers. It was built by E. Barker, Sheffield 9.

An interesting scheme, and one that would provide many pleasant hours of model-building, would be to construct a series of simplicity models depicting the development of the locomotive. These could be built on similar lines to the small *"Rocket"* locomotive illustrated in the *"In Search of New Models"* pages of the July issue of the *"M.M."* Details and illustrations of other famous early locomotives have been given in the *"M.M.,"* and there is a wealth of information in various books and periodicals. Readers interested in such a scheme who need advice or further information should write to the Editor.

Subjects specially suitable for the attention of owners who possess Outfits Nos. 4 to 8 are the various kinds of presses used in engineering workshops. They are made in many different types and among them model-builders will be able to find one that they can build realistically with the parts at their disposal. A particularly good model of a press of the smaller type is shown in Fig. 4. Although this is simple, it possesses all the important features of its prototype and works in a most realistic manner. The die of the press is connected to a cam mounted on a shaft at the top of the machine. A second shaft, which is provided with a toothed wheel, is mounted behind the first, and the two are joined by a clutch. The clutch operating rod is connected by a series of levers to a horizontal pivoted bar mounted near the base, so that the operator is provided with an efficient and easily accessible means of foot control and his hands are left free to feed the material into the machine. This system is reproduced very neatly in the model, and the construction of the various parts can be seen in the illustration.

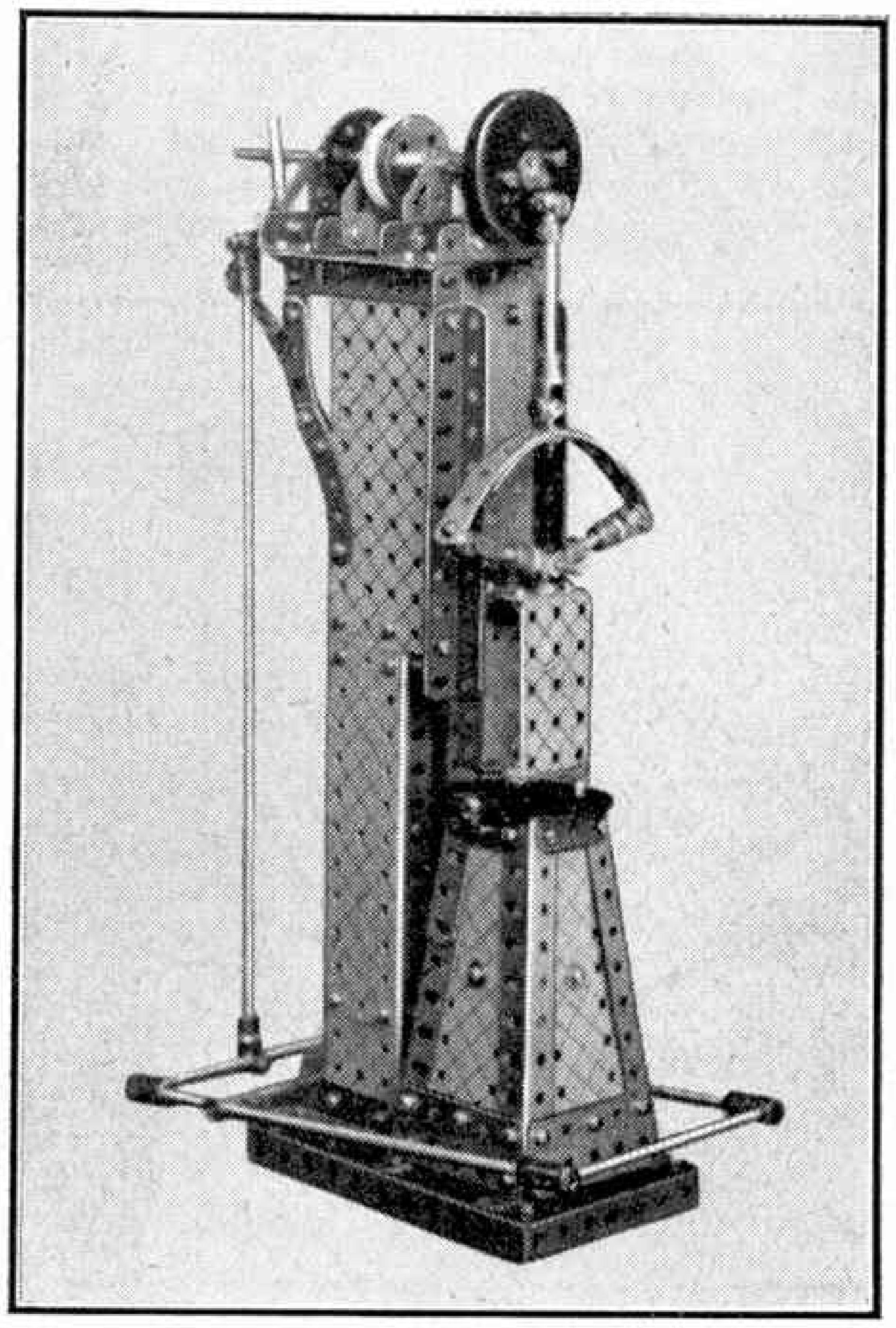


Fig. 4. A neat model of a small power press with foot control constructed by J. Usher, Dundee.

The method of connecting the die to the operating cam, which consists of a Wheel Flange bolted to a Bush Wheel, should be noted. Two Fork Pieces are attached to the upper ends of the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plates, and these are connected by a further two Fork Pieces and short Rods to the outer ends of a leaf spring built up from Strips. A 3″ Rod joins the centre of the leaf spring to the cam.

Other types of machines that can be modelled in Meccano are drop hammers and hydraulic presses. An article describing a hydraulic press appeared in the May 1938 *"M.M.,"* and will prove helpful to readers who wish to tackle a model of this kind.

The remaining model to be mentioned is the hand grinding machine shown in Fig. 3. This model is built with only a few parts, and when constructed is a practical and handy appliance that can be used effectively for sharpening pencils and penknives. The base of the machine is built up from Flat Plates and Flanged Plates, but can easily be modified to suit the parts the builder possesses. Flanges are provided at each side of the base so that the model can be screwed to a bench.

The handle is fitted on a Rod journalled in the sides of the base and is geared to the grinding wheel shaft by means of a $3\frac{1}{2}''$ Gear and a $\frac{1}{2}''$ Pinion. If a small emery wheel is not available a satisfactory substitute can be made by gluing either emery or sand paper to a shaped block of wood. Another idea is to bolt two Hub Discs together and glue the emery paper to them. If a wood block is used, it should be fastened to the shaft by a Face Plate or Bush Wheel.

A rest is provided at the front of the grinding machine on which the pencil or penknife is held while being sharpened. It consists of an Angle Girder bolted to a Corner Bracket, and it is mounted on a Rod by means of a Crank, so that it can be swivelled to one side when not required.

Other useful tools that can be made from Meccano are fretsaw machines, hacksaw frames, drills and gauges. Fretsaws and hacksaw frames can be fitted with tensioning devices operated by means of Screwed Rods and Collars, while Couplings will be found useful also as drill chucks, the drill being inserted in the longitudinal bore and held firmly by the grub screws. A simple but efficient wood gauge can be constructed by fixing a gramophone needle to one end of a Rod and at right angles to it, by means of a Coupling, and then fitting a second Coupling on the Rod so that it can be moved backward and forward as required.

Simple lathes capable of turning small wooden articles also can be made in Meccano, but these are subjects best suited for the attention of readers who possess a really good stock of parts. An excellent model of this type was illustrated on page 173 of the *"M.M."* for March 1938, and will provide a good guide for anyone wishing to construct similar models for themselves. Power driven drilling machines also provide good subjects for boys who possess a good variety of parts.

Meccano Suggestions Section

By "Spanner"

(413) Variable Speed Drive (L. Linder, Stockholm)

One of the simplest methods of constructing variable speed gears for use in models is to employ the well-known friction disc principle. A neat unit of this type that will find many uses in Meccano models was built by L. Linder, Stockholm, Sweden, and is shown in Fig. 413. It can be used in the Meccanograph, Model No. 8.22, described in the Manual of Instructions for Outfits Nos. 7 and 8, for varying the speed of the Designing Table while the model is in operation. Alternatively it can be used as a reversing gear by sliding the 1″ Pulley across the Face Plate.

The mechanism is contained between two 2½″ × 2½″ Flat Plates bolted one at each end of a 5½″ × 2½″ Flanged Plate. The Face Plate 1 forms the friction disc and is coupled to the shaft it is required to drive. The Rod locked in its boss carries a Compression Spring between the Face Plate and Flanged Plate, and serves to hold the former in contact with the 1″ Pulley 3 fitted with Rubber Tyre.

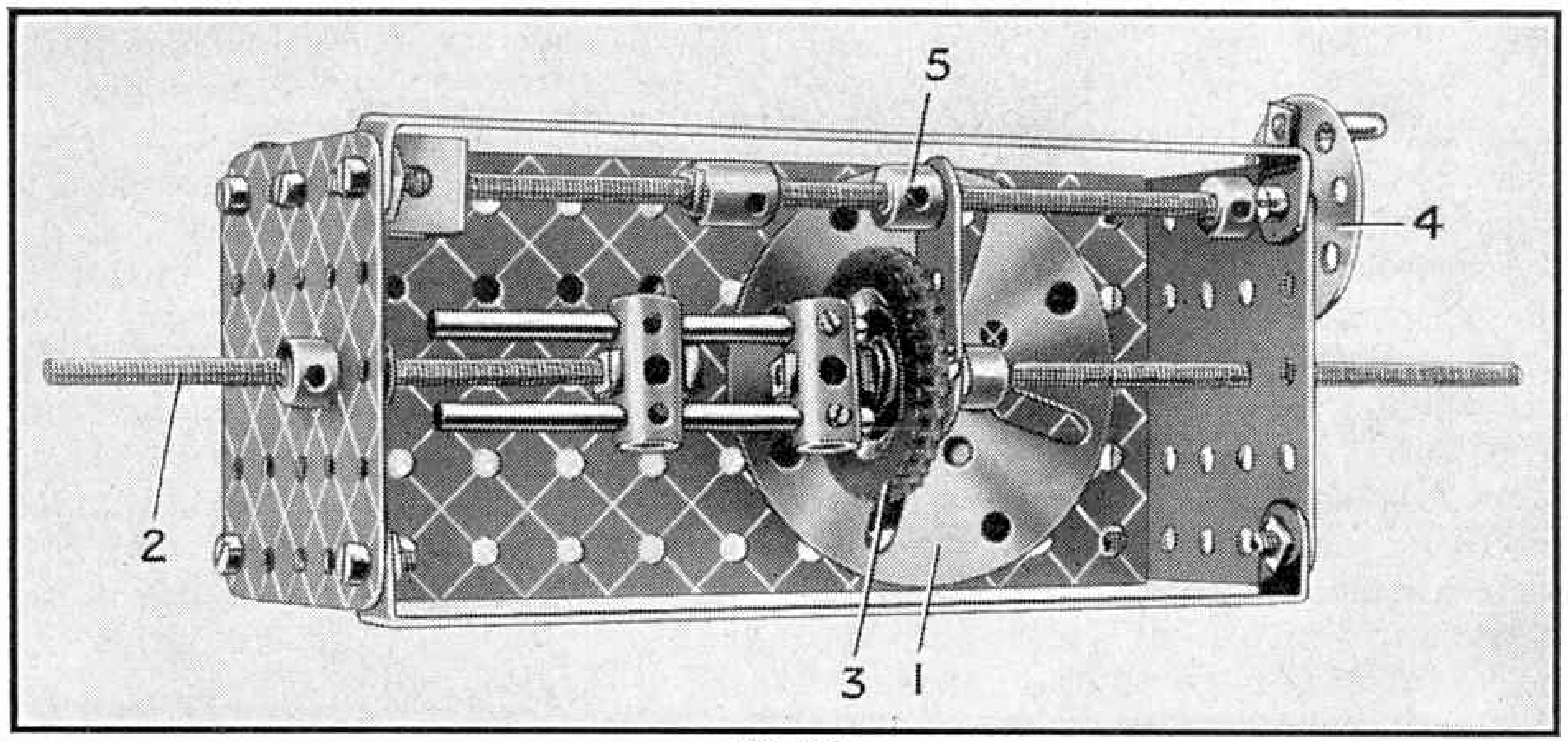


Fig. 413

The 1″ Pulley is fastened on a 5″ Screwed Rod, which is lock-nutted in the centre tapped hole of a Coupling. Two 3″ Rods are gripped in the end plain bores of this Coupling. The end of a Threaded Crank is slipped on the 5″ Screwed Rod, and a Collar keeps it in contact with the boss of the 1″ Pulley. The 3″ Rods are free to slide in the end plain holes of a second Coupling, which is lock-nutted on the end of a 3½″ Screwed Rod that is prevented from moving endways in its bearings by two Collars. The last-mentioned Screwed Rod is connected to the driving unit.

In order to vary the speed of the drive it is necessary to move the 1″ Pulley across the surface of the Face Plate, and to facilitate this a 6″ Screwed Rod is journalled above the shafts already fitted. The Threaded Crank 5 is screwed on to the Screwed Rod, and a stop formed by a Threaded Boss is held in place by a lock-nut in order to prevent the Rubber Tyre leaving the Face Plate. When the handwheel 4, formed by a Bush Wheel fitted with a Threaded Pin, is rotated, the Threaded Crank moves along the Screwed Rod and carries with it the 1″ Pulley. A disc of emery cloth can be glued to the Face Plate to provide a good friction surface, but if only a light drive is being transmitted this is not necessary.

When the variable speed drive is incorporated in a model it is not necessary to use the framework shown in Fig. 413. For example, in building it into the Meccanograph mentioned above, the friction disc would be secured on the lower end of the designing table shaft, and the 1″ Pulley with Tyre would be coupled to the end of the driving shaft. The controlling mechanism could then be journalled horizontally with the handwheel in an easily accessible position outside the framework of the model.

(414) Positive Front Wheel Steering (W. Lee, Bristol)

There are many different ways of building up steering mechanisms for motor cars and other wheeled vehicles in Meccano. The more usual types are those based on the Ackermann system, whereby all four wheels of the car turn about the same centre. In these systems only one of the front wheels is steered directly from the steering column, the second wheel being connected to the first by tie-rods so that it also is turned. One type of steering gear, however, is so designed that positive steering is obtained for both front wheels. An advantage of this method is that there is little likelihood of faults developing in the mechanism, whereas when only one wheel is positively steered the vehicle may get out of control if anything happens to the connections while it is in motion.

It is not difficult to assemble the two-wheel type of mechanism in Meccano and it is an interesting variation from the steering systems usually employed in models. A Meccano example of the mechanism is shown in detail in Fig. 414.

The front wheels are mounted on stub axles in the usual manner, the king pins being 1½″ Rods free to rotate in the bosses of Cranks bolted to the front axle. The stub axles are fixed to the king pins, to the upper ends of which are fastened ½″ Pinions as shown. The shaft 1, which is operated by the steering wheel, is journalled in Trunnions and carries a Worm 2 at each end. The Worms mesh with the ½″ Pinions on the king pins. When the steering wheel is rotated, the motion is transmitted through the 1½″ Contrate to the ¾″ Pinion on the shaft 1. The rotation of the Worms then operates the front wheels.

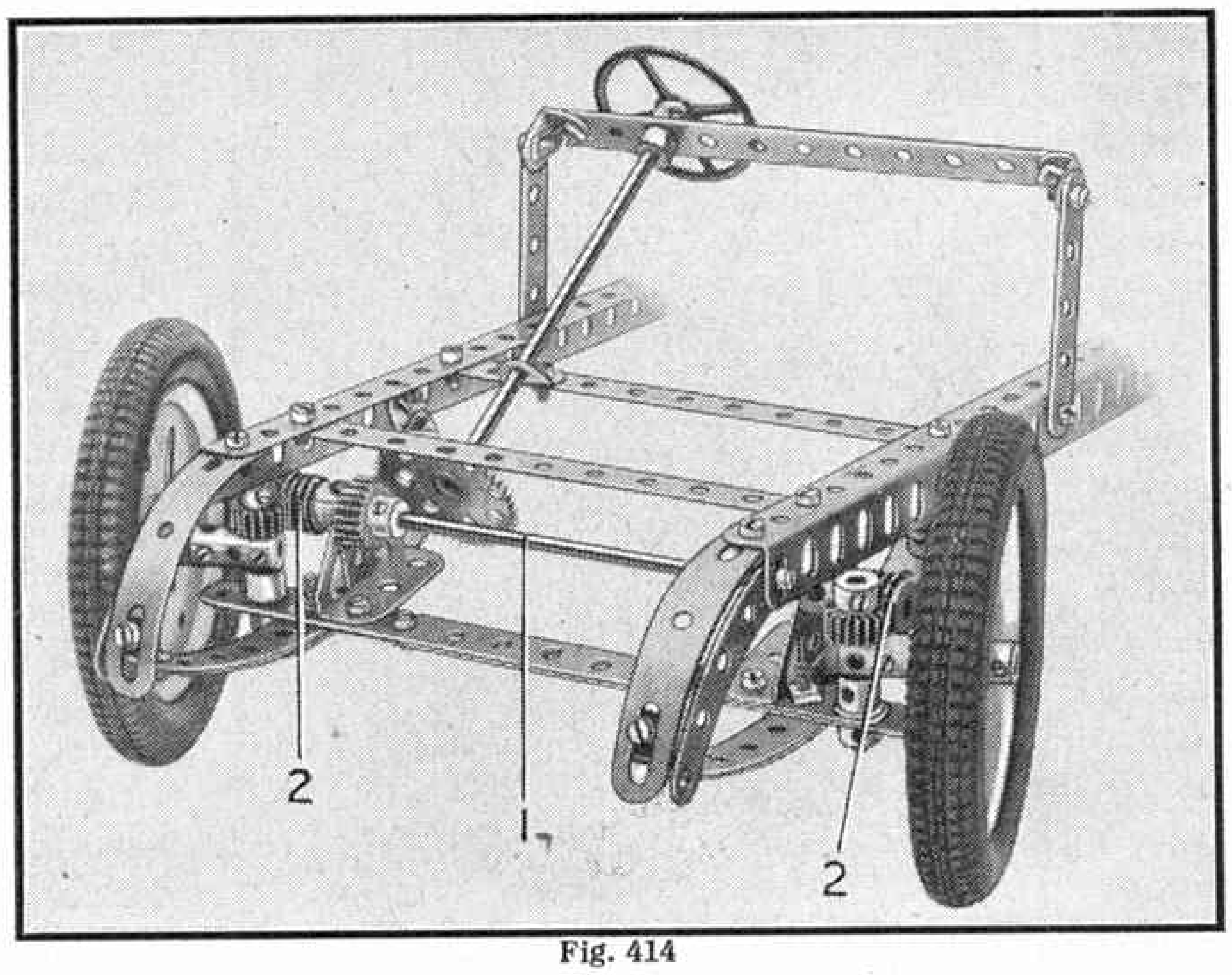


Fig. 414

It will be seen from the illustration that the system is very simple. When once adjusted it needs no further attention.

(415) Free Wheel Clutch

A free wheel movement has been the subject of previous suggestions that have appeared from time to time in the "*M.M.*" This month, however, we are describing a simple free wheel clutch built on rather different lines.

It comprises two 3″ pulleys joined together by means of two 2″ Screwed Rods. Four nuts on each of the Rods serve to hold the Pulleys in place on the Rods the correct distance apart, which should be such that the two 1⅛″ Flanged Wheels may be accommodated in the space between. The Flanged Wheels are bolted together on a 3½″ Rod that is free to turn the bosses of the 3″ Pulleys.

A short length of Meccano Cord is doubled and wrapped round the Wheels. The free ends are then passed through the loop and secured to one of the Screwed Rods. It will be found that when the 3½″ Rod is prevented from rotating it is possible to turn the 3″ Pulleys easily in one direction, but in the reverse direction considerably greater effort is required.

(416) A Novel Motion Converter

(K. Keene, Carlisle)

The mechanism shown in Fig. 416 is a novel device for converting reciprocating motion into circular motion, and is the work of K. Keene, Carlisle.

A framework consisting of Angle Girders of various sizes fastened together in the manner shown in Fig. 416 is used to carry the mechanism. The upper Angle Girders carry 5″ Rods, which are locked in Collars carried on bolts, and along them slide 1½″ × ½″ Double Angle Strips. Angle Brackets are bolted to the last-mentioned parts and they carry between them two 4½″ Strips bent to the shape shown. The ends of the Strips are held by ½″ Bolts and are spaced apart by four Washers. A 3″ Pulley fitted with a Threaded Pin is fastened on a Rod journalled in 4½″ Strips, the Threaded Pin being arranged to engage between the bent 4½″ Strips. It will be seen that when the slide is moved to and fro the 3″ Pulley is made to revolve.

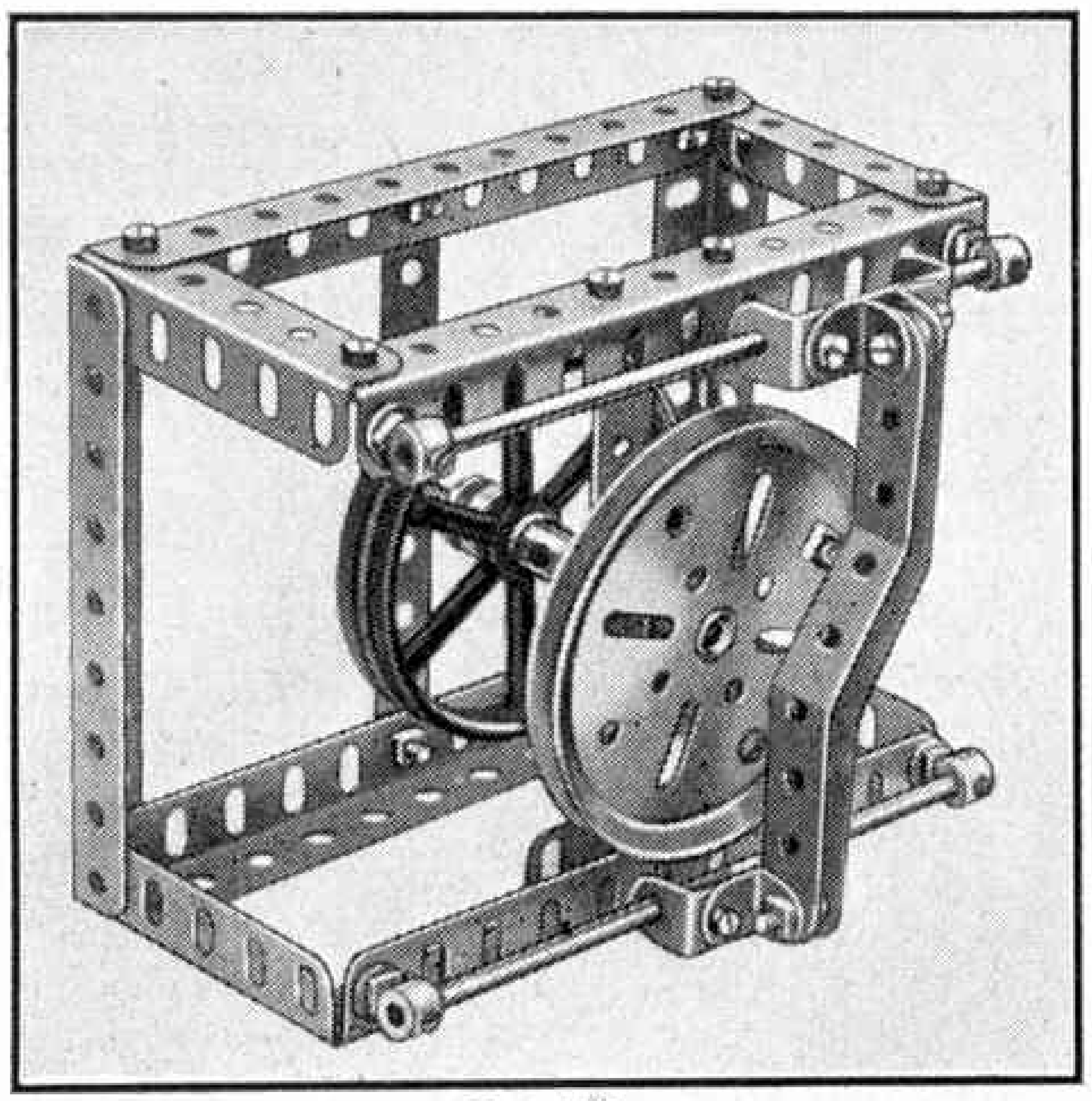


Fig. 416

The device can also be used to convert circular motion into reciprocating motion by using the shaft of the 3″ Pulley as the power input shaft. For instance the slide can be used for operating a table on a model planing machine.

(417) Independent Front Wheel Suspension (W. Burgess, Brentwood)

One of the most interesting points in connection with model motor car construction is the equipment of the chassis with a complete suspension system such as that used on actual cars. The interest lies not only in operating the completed model, but in designing an efficient system in a neat and compact manner. Several types of suspension are in use to-day, and modifications are introduced each year, so that a model-builder need never lack opportunities for experiment.

Various types of suspension systems have been described in "*Suggestions Section*" on previous occasions, and all of them are particularly suitable for use on Meccano car models. Yet another addition to the list is shown in Fig. 417. It is based on the Dubonnet independent front wheel suspension, and was designed by W. Burgess, Brentwood, Essex. A Face Plate 1 carries the mechanism. A Crank 2 is pivotally attached to the Face Plate by means of a Pivot Bolt. A Coupling 3 is then bolted to the Crank by screwing a bolt into one of its end tapped holes, and a 7/32″ Grub Screw into its other tapped hole. A nut is screwed on to the Grub Screw as shown. The Grub Screw grips also a 1″ Rod, which is passed through the end plain bore of the Coupling, and is fitted with two Washers, a second Coupling carrying Rod 4, and a Collar fitted with a Threaded Pin. Rod 4 forms the front axle of the car and the Coupling is free to swivel on the 1″ Rod.

A further Coupling is fastened to the Face Plate by a 7/32″ Grub Screw and a Bolt, and in its upper hole is a 1½″ Rod carrying a Collar and a Compression Spring 5, the Rod being free to slide to and fro. A ¾″ Bolt, held by a lock-nut in the boss of Crank 2, bears against the Collar on the sliding Rod. The road wheel is free to rotate on its stub axle, which is locked in the boss of the Face Plate. The Threaded Pin is coupled to the tie-rod of the steering mechanism.

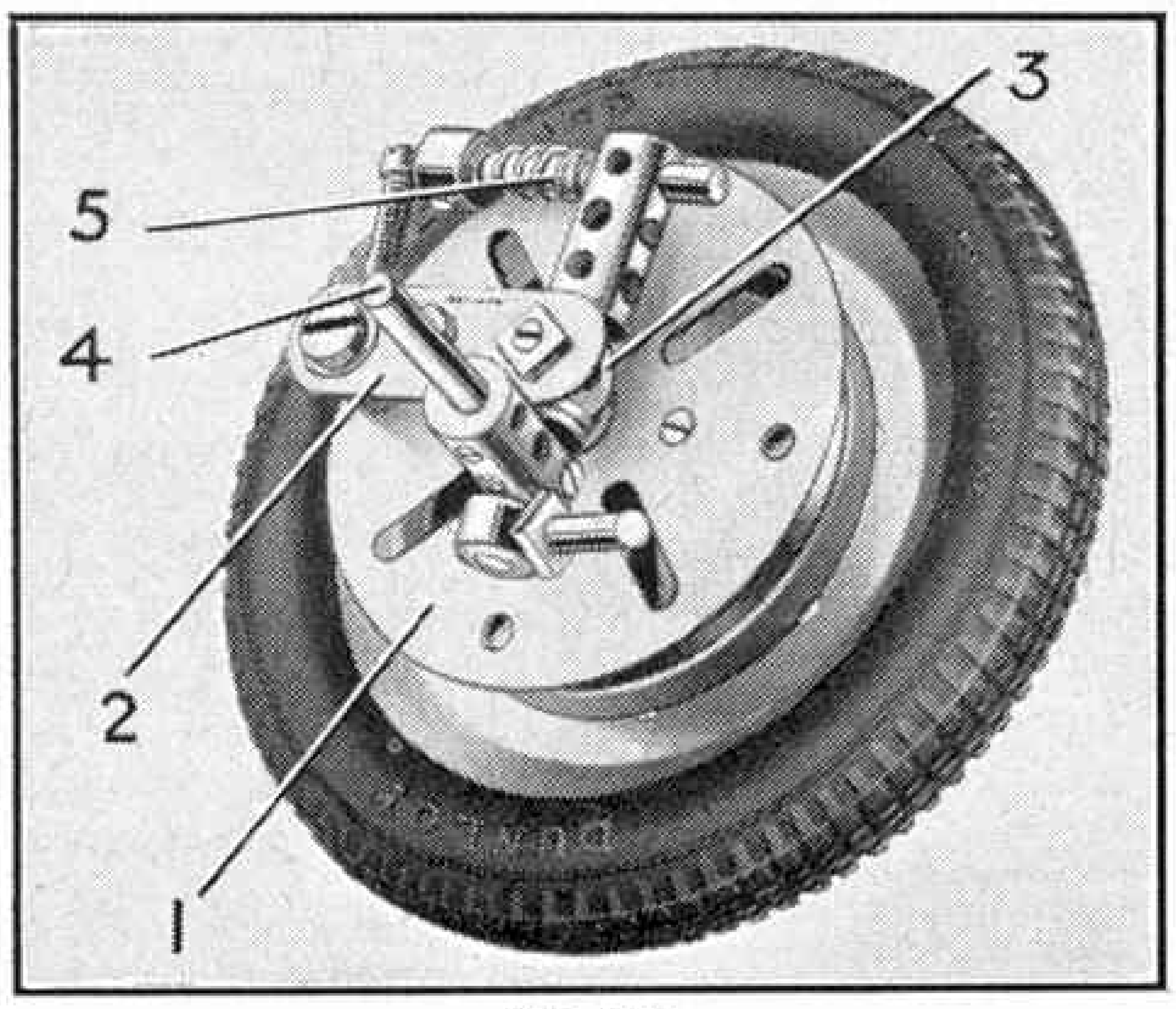


Fig. 417

It will be seen that when the mechanism is mounted on a chassis the road wheel is free to rise against the pressure of the Compression Spring, the tension of which must be adjusted according to the weight of the model.

A Boiler End is bolted to the 3″ Pulley forming the road wheel, so that a hub brake can be incorporated in the unit if desired. The Boiler End and the Face Plate are spaced apart by means of a Collar and Washers. The Threaded Pin secured in position below the front axle is coupled to the tie-rod of the steering mechanism, but if the steering gear described in Suggestion No. 414 is used, the Threaded Pin is replaced by a ½″ Pinion.

(418) Automatic Reverse for Clockwork Motor (M. Dobson, St. Bees, Cumberland)

An ingenious idea for automatically reversing a No. 1a or No. 2 Clockwork Motor when it is used for driving a model vehicle, is submitted by M. Dobson, St. Bees. It consists of tying one end of a length of cord to the rear axle of the model, and the other end to the reversing lever of the Motor. When the model runs along the ground, the Cord winds around the axle and pulls the reversing lever over. If it is required to operate the model first in one direction and then the other, the second Cord is fastened between the front axle and the reversing lever, so that the latter is pulled alternately in each direction.

The device can also be arranged to work effectively in a demonstration model of a crane, so that the load is alternately raised and lowered.

(419) Delayed Action Release for Camera Shutter (N. Jones, Lincoln)

Owners of cameras that do not incorporate a delayed-action shutter release can build an efficient substitute from Meccano parts that will enable them to include themselves in the pictures they take. An example of such a release is shown in Fig. 419. It was designed by N. Jones, Lincoln. When using the mechanism the camera shutter is first set at the required speed and then the flexible cable is clipped in the Angle Brackets on the side plate of the mechanism. The release mechanism is then set in operation, and after a period of about 15 seconds a rotating cam 3 presses on the cable plunger and releases the shutter.

The mechanism is operated by a *Magic* Motor, to which are bolted two 2½″ × 2½″ Flat Plates as shown. A ¾″ Contrate is fastened by two grub screws, and a ½″ Pinion 1 fastened on a 1″ Rod is arranged to mesh with it. A bearing for the 1″ Rod is provided by the boss of a Double Arm Crank. A 2″ Rod 2 is then journalled in the Flat Plates and is held in position by Collars. It carries a 1″ Pulley, which is connected by a Driving Band to the boss of the ½″ Pinion as shown. A second Driving Band passes around the 2″ Rod and also around a ½″ Pulley on a 2½″ Rod that carries the cam 3. This cam is formed by fitting a Collar on the Rod and pressing over it a Kemex Stand Clamp (Kemex part No. K.31). A 1″ Rod 4 bears against this cam and is held in a Double Bracket by a Collar and Spring Clip. Two Angle Brackets are now cut away in the manner shown in order to receive the flexible cable.

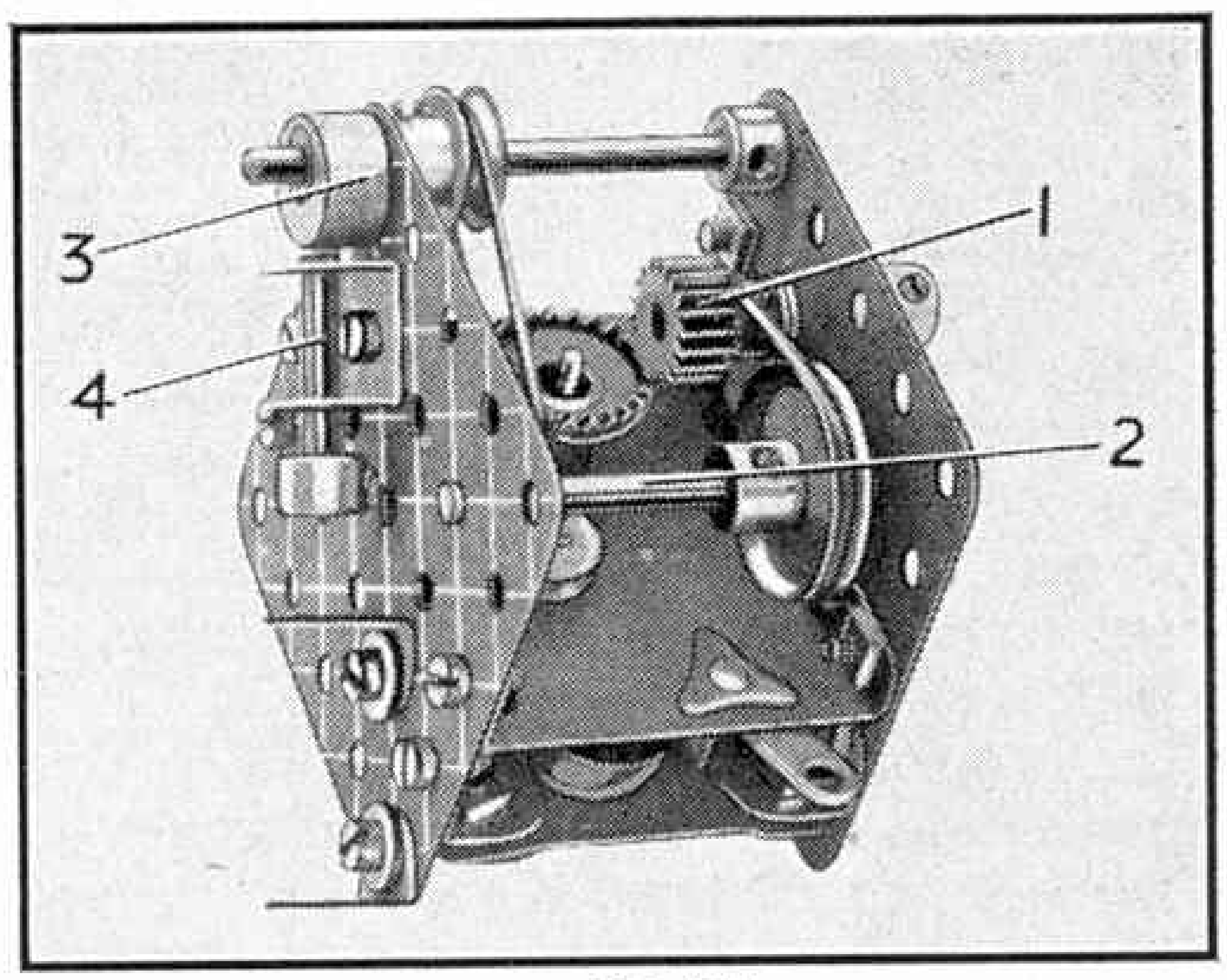


Fig. 419

Care should be taken to remove the cable from the Angle Brackets immediately the shutter has been released. If this is not done the plate will be exposed again when another 15 seconds have elapsed! In order to make absolutely sure that this will not happen, it is a good plan to wind the *Magic* Motor only partially, so that it will not run long enough to release the shutter twice.

Miscellaneous Suggestions

M.205. With Meccano Gears and Pinions almost any gear ratio required in model-building can be obtained. Most of these ratios can be arranged with only one stage of gearing, but there are a few instances, such as a 4 : 1 ratio, that require two or more stages if the standard gears are used. M. Burgess, Dublin, points out that a ratio of 4 : 1 can be obtained in a single stage by using a 1½″ Bevel Gear and a driving pinion from a No. 2 Clockwork Motor. The Bevel Gear has 48 teeth and the pinion has 12 teeth and they give a right angle drive.

New Outfit Models

Using the All-Enclosed Electric Motors

THIS month we are describing three fine models, two of which are driven by the new Meccano all-enclosed Electric Motors types E06 and E020. These Motors are very compact, and their design makes them specially suitable for building into models constructed from the smaller Outfits. The two models in which they are used are a fine motor-cycle combination, which can be assembled from the parts in Outfit No. 4, and an interesting scientific toy made from Outfit No. 2 that will provide hours of good fun when completed. The other model described in this article is a fine hammerhead crane designed for Outfit No. 6.

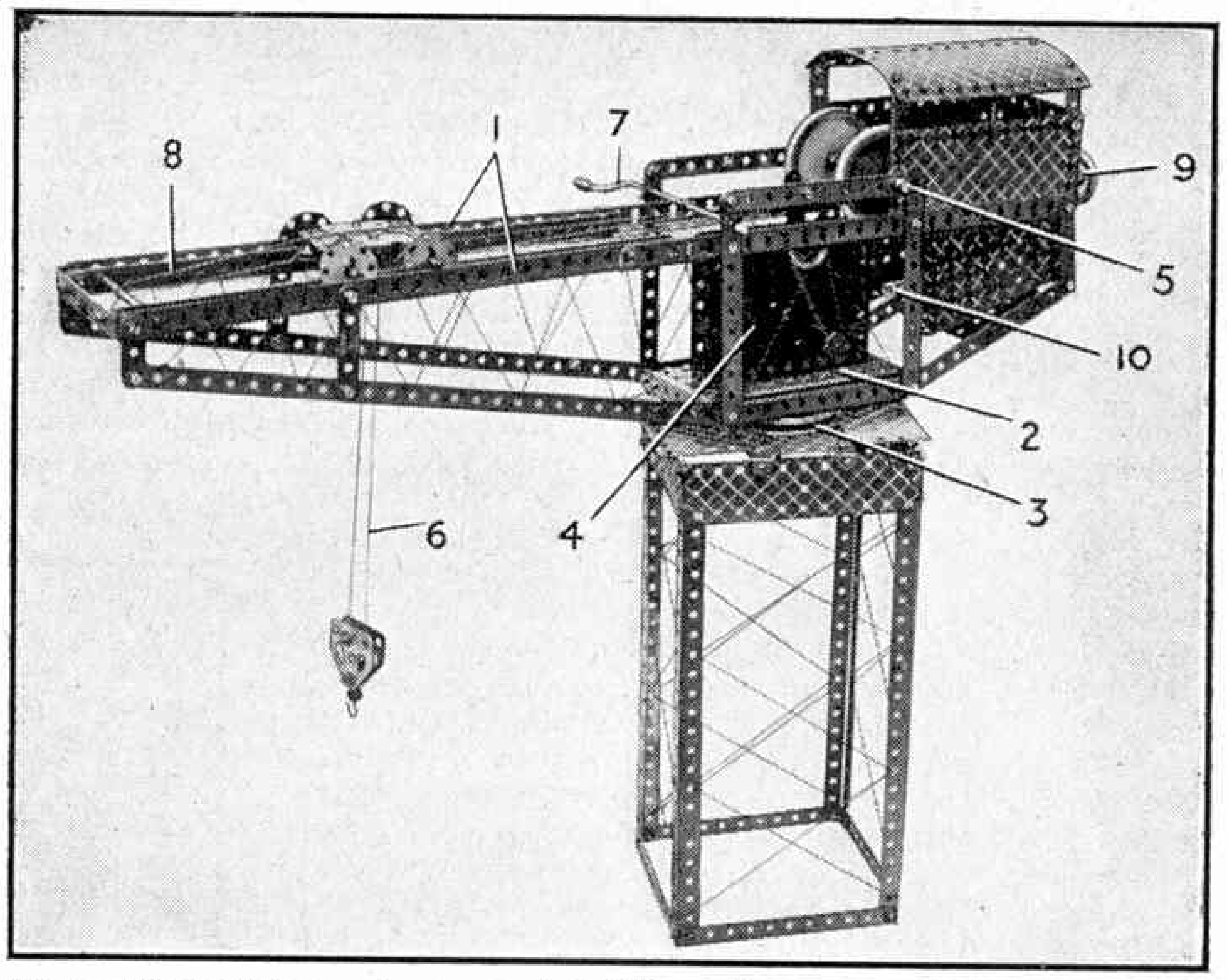


Fig. 1. This model hammerhead crane is built from the contents of Outfit No. 6, and is operated by a No. 1a Clockwork Motor controlled from the driver's cab.

The hammerhead crane is illustrated in Fig. 1. The tower is constructed as shown, and a 3" Pulley 3 is bolted to it. The main members 1 of the rotating boom each consists of two 12½" Angle Girders overlapped three holes, and they are connected at one end by a 3½"×½" Double Angle Strip, and at the other end by a 3½"×2½" Flanged Plate. A 2½"×½" Double Angle Strip is then bolted to the first Double Angle Strip, and to its lugs are fastened 12½" Strips, their free ends being attached by Double Brackets to the girders 1.

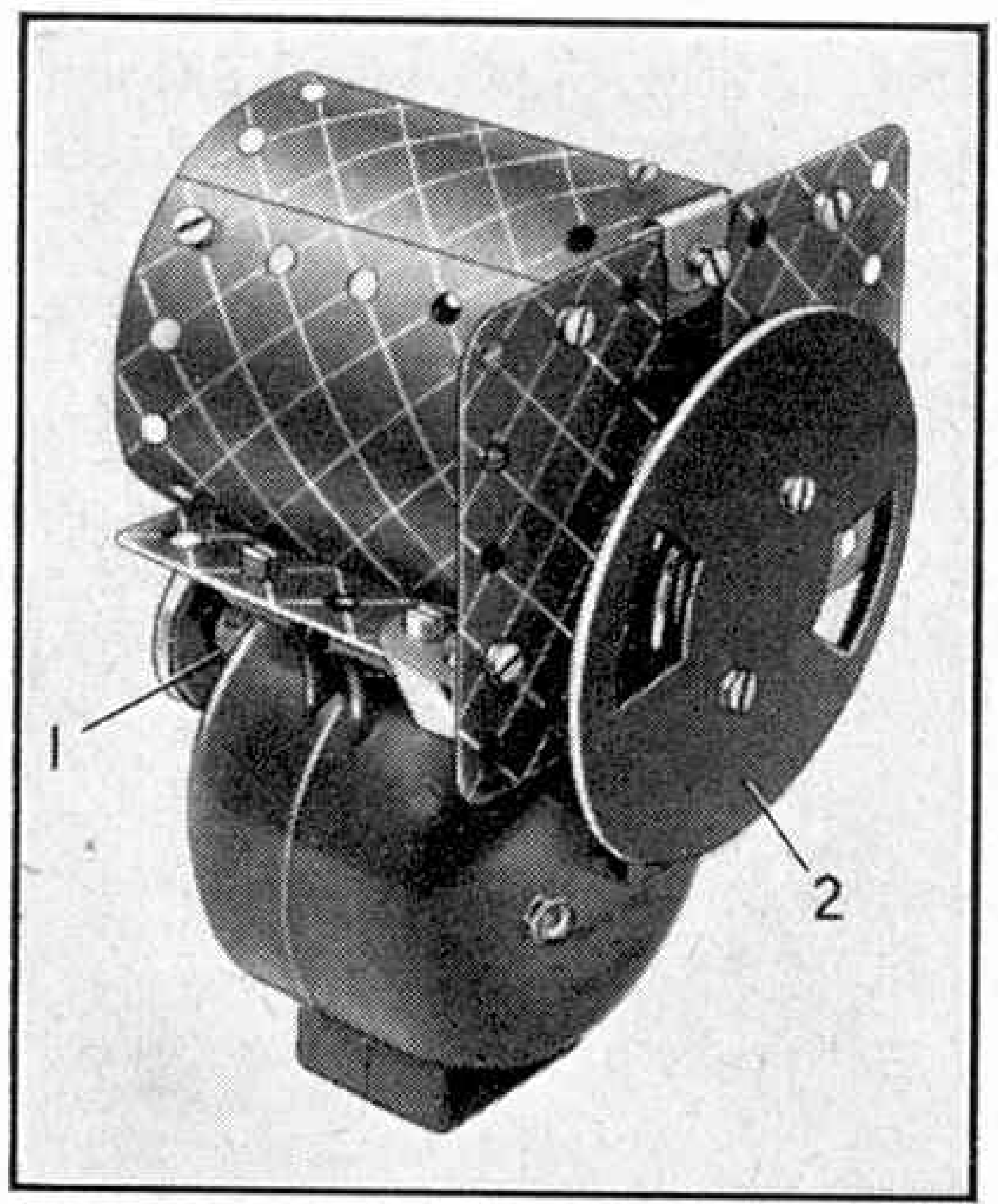


Fig. 2. An interesting toy operated by one of the new all-enclosed Electric Motors.

The girders 1 are now connected with the lower members of the boom, which consist of 12½" Strips extended by 2½" and 5½" Strips. The latter are connected to the 3½"×2½" Flanged Plate, and are joined also to the 2½" Strips by further 5½" Strips. The latter parts in turn are connected to the girders 1 by 5½" Strips as shown. The lower members of the jib are joined by 3½" Strips that support also a 5½"×2½" Flanged Plate 2, to which is fastened a 3" Pulley.

The No. 1a Clockwork Motor 4 is mounted on the Flanged Plate 2 by means of Double Brackets, and to its brake lever is pivoted a 5" Rod by means of Collar 10. In a similar manner an 11½" Rod 9 is pivotally attached to the reverse lever of the Motor. Both Rods protrude through the 3½"×2½" Flanged Plate at the rear end of the jib and are each fitted with a 1" Pulley.

The sides of the control cabin consist of 5½"×2½" Flexible Plates, which are joined at the rear by a 3½"×½" Double Angle Strip and two 2½"×2½" Flexible Plates. The roof consists of two 5½"×2½" Flexible Plates, and is supported by four 2½" Strips. The jib is pivoted on a 3½" Rod locked in the boss of the upper 3" Pulley and retained in position by a Spring Clip below Pulley 3.

The hoisting trolley is a 2½"×1½" Flanged Plate, to each flange of which is bolted a 1½"×½" Double Angle Strip. The latter provide bearings for the 3½" Rods that carry the 1¼" Discs forming the wheels. Trunnions bolted to the Flanged Plate carry a 2" Rod, on which are two 1" loose Pulleys.

The Crank Handle 7 controls the traversing movement of the hoisting trolley. Cord 8 is tied to the rear of the trolley, then wound a few times round Crank Handle 7 and led around a 3½" Rod journalled at the front end of the jib. It is then tied to the front of the trolley.

The hoisting drum is a 4½" Rod 5, and is driven in the following manner. A ½" Pulley on the driving shaft of the Motor is connected by a Driving Band to a 1" Pulley fastened on a 2" Rod journalled in the side plates of the Motor. A second Driving Band connects the 2" Rod to a 1" Pulley on Rod 5.

The hoisting Cord 6 is tied to a Cord Anchoring Spring on Rod 5 and is led over one of the 1" loose Pulleys in the hoisting trolley. It is then passed around the ½" Pulley in the hoisting block and led over the second 1" loose Pulley in the hoisting trolley. Finally it is tied to the front end of the boom.

Parts required to build the model hammerhead crane: 12 of No. 1; 14 of No. 2; 4 of No. 3; 2 of No. 4; 8 of No. 5; 2 of No. 6a; 4 of No. 8; 4 of No. 11; 16 of No. 12; 4 of No. 12c; 1 of No. 13; 1 of No. 15; 1 of No. 15a; 4 of No. 16; 2 of No. 17; 2 of No. 19b; 1 of No. 19h; 4 of No. 22; 2 of No. 22a; 1 of No. 23; 1 of No. 23a; 14 of No. 35; 105 of No. 37; 5 of No. 37a; 12 of No. 38; 2 of No. 40; 2 of No. 48; 1 of No. 48a; 2 of No. 48b; 1 of No. 51; 1 of No. 52; 2 of No. 53; 2 of No. 54a; 1 of No. 57c; 4 of No. 59; 2 of No. 111; 1 of No. 111a; 2 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 147b; 2 of No. 155a; 2 of No. 186; 2 of No. 187; 4 of No. 189; 4 of No. 190; 4 of No. 192; 1 of No. 198; 4 of No. 217a; 1 No. 1a Clockwork Motor (not included in Outfit).

The model shown in Fig. 2 is a very interesting toy based on the ingenious instrument known as the stroboscope, which is used for observing the behaviour of gears, shafts and other parts of machinery while actually in motion. When viewed through the stroboscope these appear to be at rest, an effect that is attained by observing them through a slit placed in front of a rapidly revolving shutter, the speed of which can be varied at will. If the shutter is made to rotate at the same speed as the wheel or other moving object it is desired to examine, the eye receives a succession of glimpses of the mechanism at the same point in its rotation. Owing to the persistence of the image formed in the eye, this series of glimpses blends into a continuous steady image.

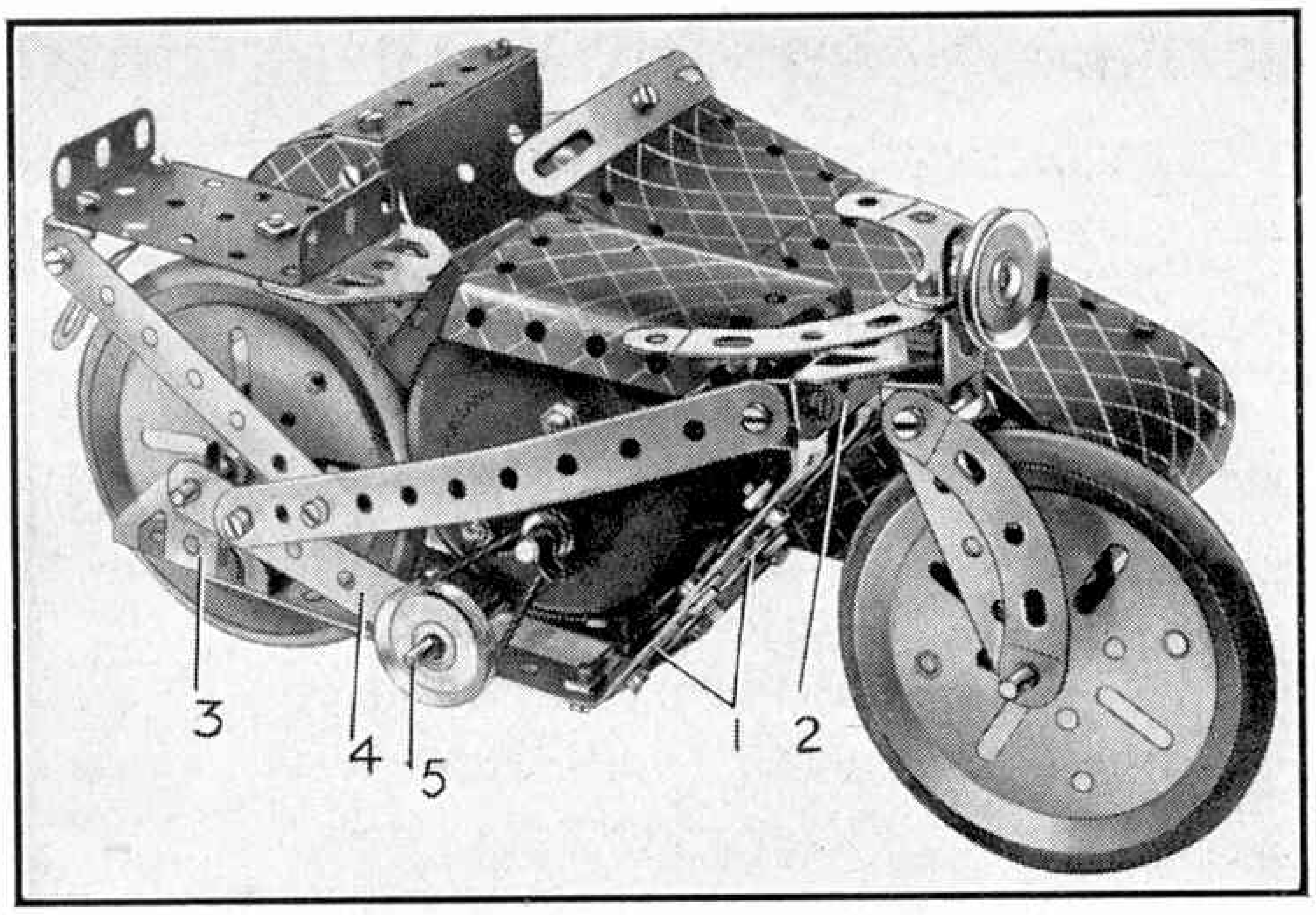


Fig. 3. The design of the new all-enclosed Electric Motors makes them ideal power units for models such as the motor-cycle combination shown here.

Many fascinating experiments can be carried out with the model. For example a word written on a piece of paper pasted on a rapidly revolving disc of cardboard can be read quite easily when viewed through the stroboscope.

To construct the model, a 2½″ × 2½″ Flexible Plate is bolted to the perforated feet of either an E06 or E020 Electric Motor, using 2½″ Strips to strengthen the edges of the Plate. Two 2½″ × 1½″ Flexible Plates are then fixed vertically to the Plate by means of Trunnions, with a space ½″ wide between their edges, and are connected at their upper edges by a 2½″ Strip. A 2½″ × ½″ Double Angle Strip is bolted across the 2½″ × 2½″ Flexible Plate and forms bearings for a 3½″ Rod, on one end of which is fastened a 1″ Pulley 1. The Pulley is connected to the small pulley on the armature shaft of the Motor. The other end of the 3½″ Rod carries a disc 2, which is cut from a sheet of cardboard and bolted to a Bush Wheel. Two curved slots about ½″ long and ⅛″ wide are cut in the card diametrically opposite to each other, as shown in Fig. 2, and to complete the model it is only necessary to fit a viewing tube consisting of Curved Plates. A Hornby Resistance Controller is connected in series with the Electric Motor and Transformer, or accumulator, so that the speed of the disc can be adjusted as required.

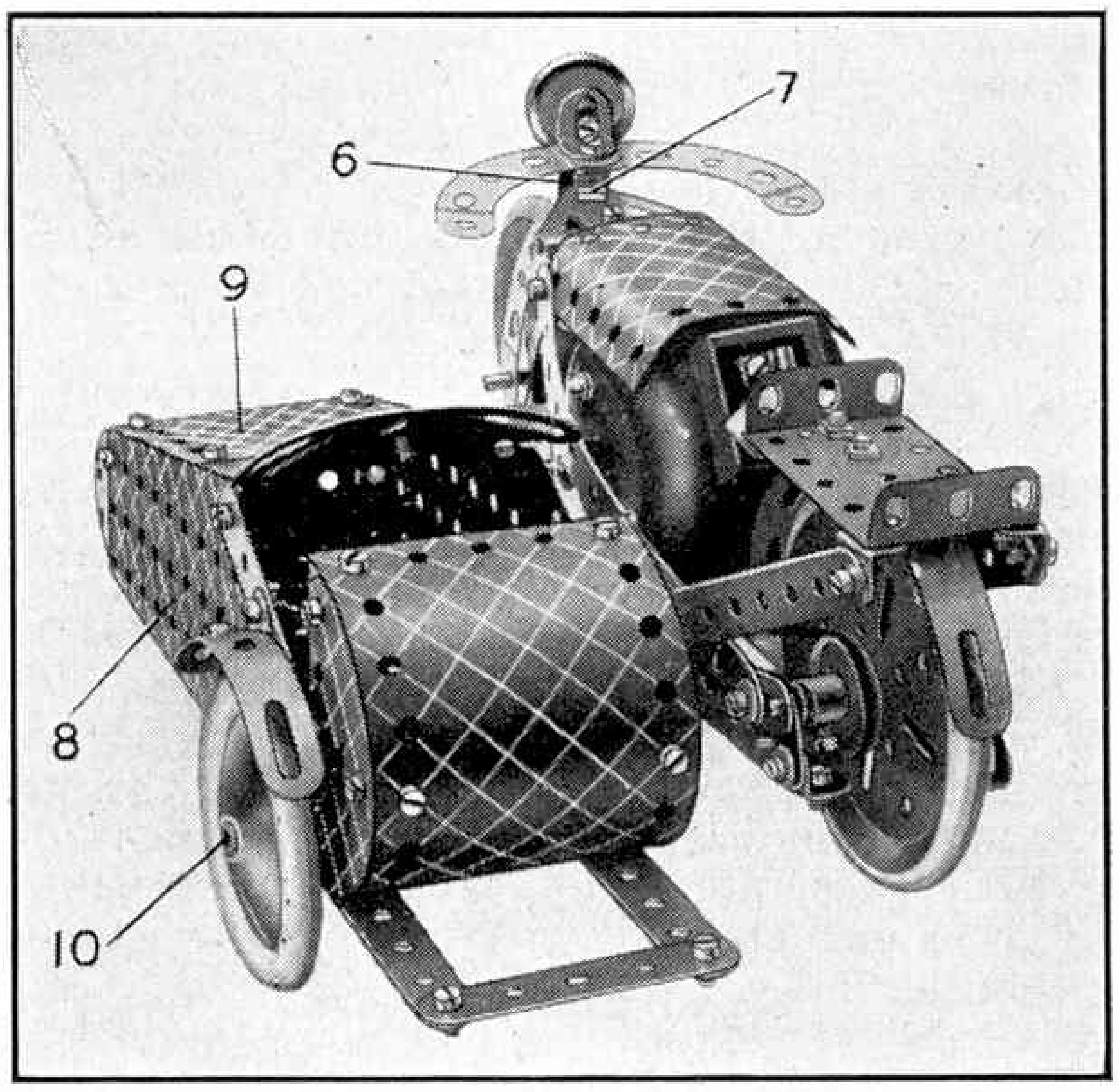


Fig. 4. A rear view of the motor-cycle combination, showing details of the drive to the rear wheel and the construction of the side-car.

The model is now ready for operation. In use it is held with the viewing tube pointing towards the object in motion that is to be examined and the latter is looked at through the slots in the disc.

Any regular motion, either circular or vibratory, is an interesting subject upon which the model stroboscope can be tried out. For example, the motion of miniature waves formed by a tap dripping rapidly into a bowl of water can be "frozen," or the wheels of motor cars or bicycles can be "stopped" although they are actually in motion.

Parts required to build the model stroboscope: 3 of No. 5; 1 of No. 12; 1 of No. 16; 1 of No. 22; 1 of No. 24; 20 of No. 37; 2 of No. 126; 1 of No. 186; 2 of No. 188; 1 of No. 190; 1 of No. 199; 2 of No. 200; 1 disc of cardboard; 1 E06 or E020 Electric Motor (not included in Outfit).

The remaining model to be described is the motor-cycle combination shown in Figs. 3 and 4. The all-enclosed Electric Motor is particularly suitable for incorporation in a model of this type, as it can be built neatly into the structure.

Two 5½″ Strips 1 are extended by 2½″ Strips, the compound strips so formed being bent to the shape shown. They are then bolted at their lower ends to the feet of the Motor and at their upper ends to the Trunnion 2, the bolts in the latter holding also Angle Brackets. The 5½″ Strips are further joined by the 5½″ Strips that connect the side-car to the motor-cycle, the bolts of the rear Strip carrying also a 1½″ × ½″ Double Angle Strip.

The Trunnion 3 and the Flat Bracket, supported by an Angle Bracket, that is seen in Fig. 4, provide bearings for the rear axle, and are connected by two 2½″ Strips 4 to the 1½″ × ½″ Double Angle Strip previously mentioned. The bolts passing through the ends of the Double Angle Strips carry also Flat Brackets that form bearings for the 3½″ Rod 5. A 1″ Pulley on this Rod is connected by a 2½″ Driving Band to the armature shaft of the Motor, and a second Driving Band is passed around the Rod and a 1″ Pulley on the rear axle. The latter is a 2″ Rod fitted with a 3″ Pulley shod with a 3″ Rubber Ring.

The 2½″ Strips 4 are connected by 5½″ Strips to the Angle Brackets bolted to Trunnion 2.

The steering gear is next fitted. The front forks consist of 2½″ Strips and 2½″ Curved Strips bolted to a Double Bracket. One of the lugs of a second Double Bracket 6 is inserted between the lugs of the first and is held there by a ⅜″ Bolt 7 and a nut. A Flat Bracket is then bolted to Trunnion 2, but is spaced from the Trunnion by a Washer. The ⅜″ Bolt 7 is inserted through holes in the Flat Bracket and Trunnion 2, and is retained in position by lock-nuts. Two 2½″ Curved Strips are then bolted to Double Bracket 6 to form the handle-bars.

The side-car is built up on a 5½″ × 2½″ Flanged Plate, to which are bolted two Flanged Sector Plates and a 5½″ × 2½″ Flexible Plate that is extended by a 2½″ × 2½″ Flexible Plate to form the front and top. The sides are extended to the rear by 2½″ × 1½″ Flexible Plates, to each of which is bolted a 2½″ Semi-Circular Plate. A second 5½″ × 2½″ Flexible Plate, supported by 2½″ × ½″ Double Angle Strips, is curved round to form the back.

Parts required to build the model motor-cycle and side-car: 8 of No. 2; 2 of No. 3; 9 of No. 5; 4 of No. 10; 2 of No. 11; 7 of No. 12; 2 of No. 16; 1 of No. 17; 1 of No. 18a; 2 of No. 19b; 3 of No. 22; 5 of No. 35; 68 of No. 37; 4 of No. 37a; 14 of No. 38; 1 of No. 48; 2 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54a; 4 of No. 90a; 2 of No. 126; 2 of No. 126a; 2 of No. 186; 1 of No. 187; 2 of No. 188; 2 of No. 190; 2 of No. 192; 2 of No. 214; 4 of No. 215; 2 of No. 217a; 2–3″ Rubber Rings; 1 E06 or E020 Electric Motor (not included in Outfit).

Grand "Summer" Model-Building Competition

Closing Date: 30th September

Last Few Weeks to Send in Entries

Within the next few weeks some lucky model-builder will be invited to select Meccano or Hornby goods to the value of £5/5/- from current Meccano catalogues, and the goods he chooses will be presented to him free of charge! This fine gift will form the First Prize in the great "Summer" Model-Building Competition, and any "*M.M.*" reader who cares to make the small effort necessary to prepare and send in an entry, will stand a good chance of being the fortunate recipient!

Previous announcements of this great competition appeared in the July and August issues of the "*M.M.*" It is still open for entries, and no model-builder should miss this fine opportunity to win a valuable prize. Readers who have not yet sent in their entries, however, should set to work and prepare them immediately. The Contest closes on 30th September, so there is now no time to lose.

The Grand "Summer" Competition is the first of an entirely new series of model-building competitions in which we are offering bigger prizes than ever before. Every owner of a Meccano Outfit of any size may send in an entry, and there are no fees to pay or entry forms to fill in. Also, it does not matter whether competitors live in England or any other part of the world; all entries will be welcome and will stand equal chances of winning the fine prizes offered.

The prizes are offered for the best models of any kind whatever built entirely from Meccano parts. All that a competitor has to do is to think of some new and original subject and then set to work to reproduce it in Meccano, as neatly and realistically as possible. Any number of Meccano parts may be used, but all models submitted must be the competitor's own handiwork, both in design and construction.

When the model is completed a photograph or a good drawing of it should be sent to "*Summer General Model-Building Contest,*" Meccano Ltd., Binns Road, Liverpool 13. If the model is a large and complicated one it will be as well to send a written description of its principal parts and movements, in addition to the photograph or drawing. More than one model may be submitted if desired, but no competitor will be awarded more than one prize. If two or more models are sent by one entrant they will be considered jointly.

The sender's age, name and address, and the name of the competition, must be written on the back of each photograph or drawing submitted, and all entries must reach Liverpool not later than 30th September.

Prize-winners will be notified by post as soon after the closing date as possible, and they will have the opportunity of choosing any items they like from current Meccano and Hornby price-lists. Models that already appear in any of the Meccano publications are not eligible for entry in this Contest. Photographs or drawings of prize-winning models become the property of Meccano Ltd., but unsuccessful entries will be returned if a stamped addressed envelope is sent for that purpose.

Grand "Summer" Model-Building Competition

Closing Date: 30th September

FINE PRIZES YOU CAN WIN

First Prize, Meccano or Hornby goods value £5/5/-.
Second Prize, Meccano or Hornby goods value £3/3/-.
Third Prize, Meccano or Hornby goods value £2/2/-.
Ten Prizes of Meccano or Hornby goods value 10/6.

There will be also consolation awards and Certificates of Merit.

Send in *YOUR* Entry Now!

Prizes for Meccano "Suggestions"

In this Contest we are offering the fine range of prizes shown in the accompanying panel for details of novel and original Meccano mechanisms, workshop gadgets, or devices of any kind that are suitable for inclusion in the "*Suggestions Section*" pages of the "*Meccano Magazine.*"

Good examples of what are required are a miniature clutch suitable for incorporating in small model motor cars, a simple lock for a model safe and an automatic opening and closing grab for a crane. Novel gear-boxes of all kinds, reversing devices and ingenious and unusual forms of brake and free-wheel mechanisms, also will be welcome. Many readers no doubt have ideas for novel uses for Meccano parts, or for various tools that can be made in Meccano and which would be useful in the home workshop. These also will provide good subjects for entries in this Contest. A glance at the "*Suggestions Section*" pages of recent "*M.M.s*" will show exactly the kind of thing required, and it will be seen that there is very wide scope for original ideas.

It should be noted that it is not necessary to design a complete model. For example if the "suggestion" is a brake mechanism for a motor car it is only necessary to design the actual brake gear itself; a complete chassis is not required.

Competitors should send details of their suggestions to "*Suggestions Competition,*" Meccano Ltd., Binns Road, Liverpool 13. The mechanism or other device should be explained as fully and clearly as possible, and if necessary, should be illustrated with photographs or drawings. If the subject can be satisfactorily explained without illustrations, however, these may be omitted.

It is not absolutely necessary for the competitor to build up the device in Meccano before submitting his entry. Many devices that would form suitable entries can easily be described without actually constructing them. There is no reason therefore why readers who do not possess Meccano Outfits should not take part in this Contest.

Any suggestions submitted that have already been dealt with in the "*M.M.,*" will not win prizes.

"Suggestions" Competition

Closing Date: 30th October

The following prizes will be awarded for the best suggestions submitted by readers suitable for inclusion in "Suggestions Section" of the "M.M."

First Prize, Meccano or Hornby goods value £2/2/-
Second Prize, Meccano or Hornby goods value £1/1/-.
Third Prize, Meccano or Hornby goods value 10/6.
Five Prizes of Meccano or Hornby goods value 5/-.

Model-Building Competition Results

By "Spanner"

"Aircraft" Contest (Home Section)

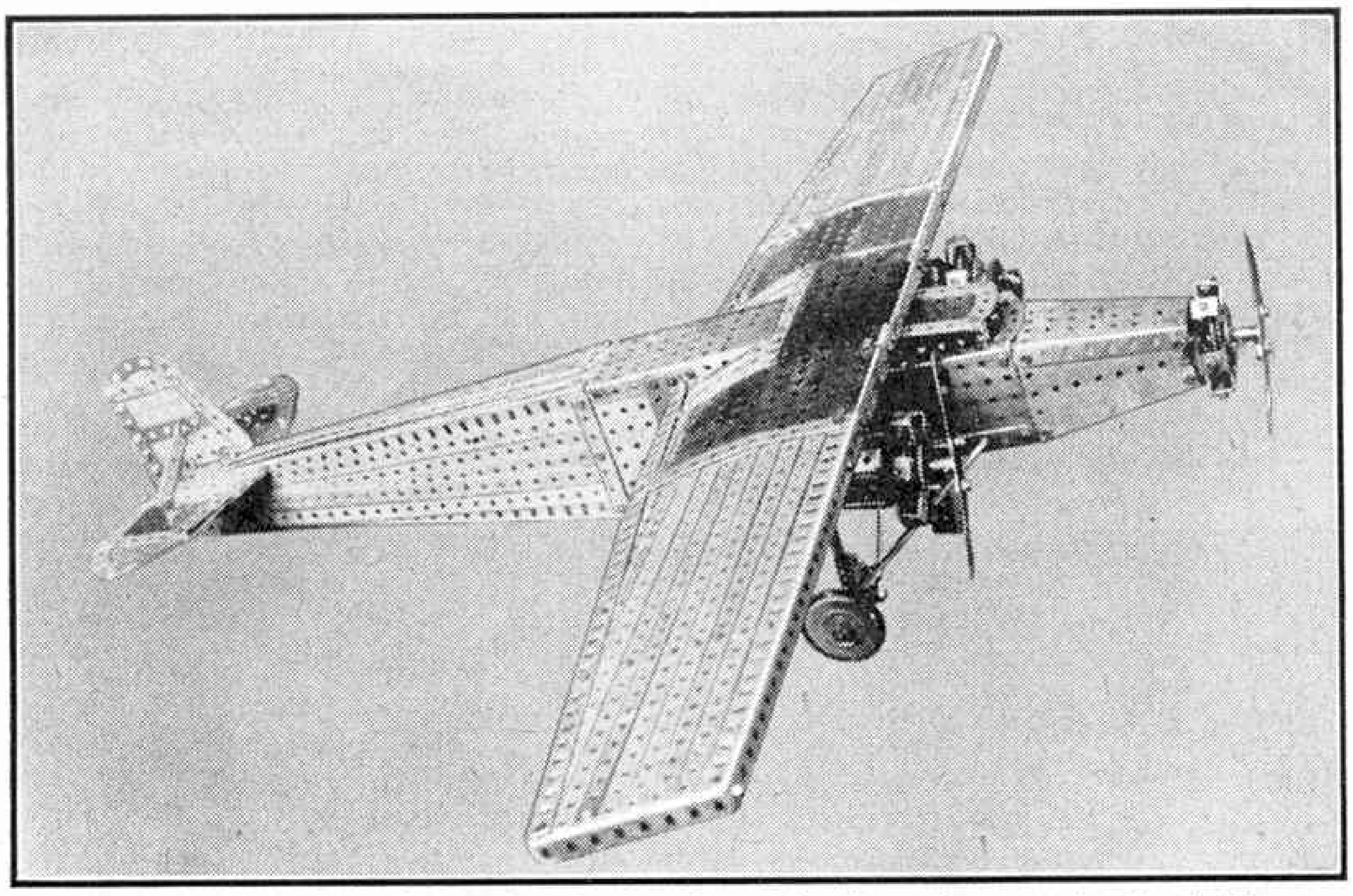
The prize-winners in the Home Section of the "Aircraft" Model-Building Competition, full details of which were announced in the April issue of the "*M.M.*," are as follows:

1st Prize, Meccano or Hornby products value £3/3/–: E. Rusted, Royston. 2nd, products value £2/2/–: D. Holden, Didcot. 3rd, products value £1/1/–: J. Brown, Fairlight Cove, Sussex.

Products value 10/6: V. Featherstone, Widnes; J. Raisbeck, Bedlington; K. Walker, Nottingham; E. Atherton, Widnes; S. Bayley, Grays.

Products value 5/–: H. Thomas, Edgware; B. Luggett, Liverpool; P. Laws, Bedlington; K. Bishop, Crowborough; J. Kennett, Richmond.

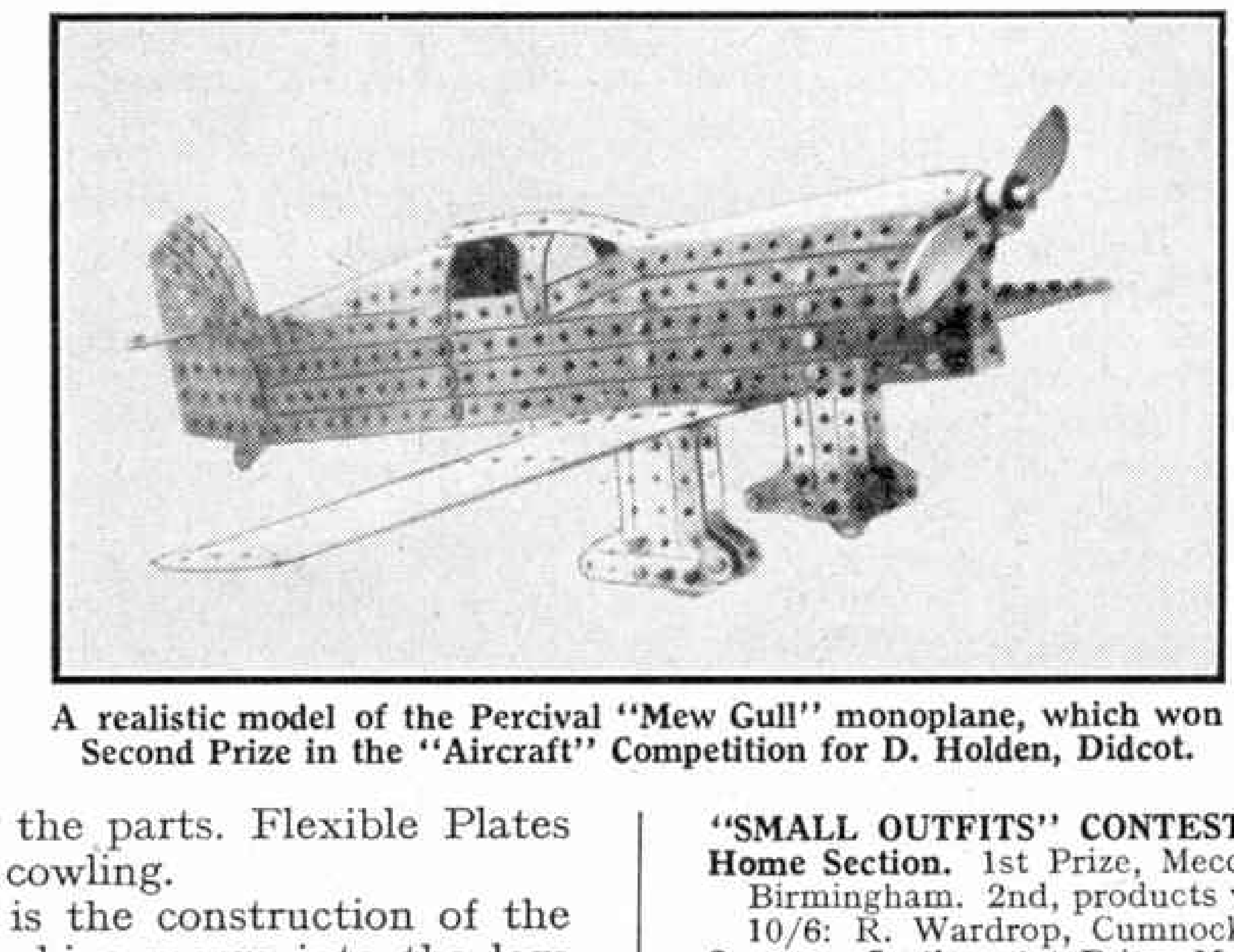
A large number of extremely realistic models of modern aircraft were received in this competition, and it needed very careful consideration to select those most worthy of the prizes. It was finally decided to award First Prize to E. Rusted, Royston, in recognition of his fine work in building a model of an Armstrong Whitworth A.W. 23 Bomber Transport machine. An actual machine of this type was illustrated in the "*Air News*" pages of the "*M.M.*" for April last, and it was that illustration that provided Rusted with the particulars he required in building the model that proved so successful in this Contest.



This high wing triple-engined monoplane is a good example of aeroplane construction in Meccano. It was built by G. K. Colenbrander Brunkelen Holland.

Flexible Plates and Strip Plates are used to good advantage in modelling the wings and fuselage, and although no attempt has been made to reproduce the rounded corners of the fuselage that are a feature of the actual machine, the appearance of the finished model is not seriously affected. Rusted displayed wisdom in selecting the prototype of his model for although it is full of interesting detail, the design of the actual machine renders it easy to reproduce realistically with Meccano parts. A point of special interest is the manner in which the transparent gun turrets are represented. On the actual machine these are metal frameworks glazed with a transparent plastic and fitted with a slot to accommodate the gun; in the model they are represented with Strips bent to shape and then threaded with Cord through their holes to form the horizontal bars. The guns are Rods fitted with Worms to represent the breeches.

Second Prize was awarded to D. Holden, Didcot, who chose for his subject the Percival "Mew Gull" monoplane. The model is very neatly constructed, and a particularly pleasing feature of it is that the fuselage is built entirely from Strips, none of which are bent. I must congratulate Holden on the realistic appearance he has succeeded in obtaining without mutilating the parts. Flexible Plates are used to form the top of the engine cowling.



A realistic model of the Percival "Mew Gull" monoplane, which won Second Prize in the "Aircraft" Competition for D. Holden, Didcot.

Another good feature of this model is the construction of the wheel fairings, which on the actual machine merge into the legs of the landing gear. The wheels are housed in Channel Bearings, which are connected to the wings by 2½" Strips. This method produces fairings that are neat and compact, and which add greatly to the fine appearance of the model.

J. Brown, Fairlight Cove, submitted a model of a D.H. "Hornet Moth," and well deserved the Third Prize awarded to him for his effort. Unfortunately the model is built to a rather small scale, which prevents the inclusion of interesting details. It is mainly the absence of these that prevented Brown from obtaining a higher award. Good use has been made of Strips and Flat Girders in the construction of the fuselage, and the wings are built entirely from Strips. The landing wheels are rather too large for the general scale of the model, however, and smaller parts would have given the model an even better appearance than it already has.

The model entered by S. Bayley was a reproduction of the Empire Flying Boat "*Caledonia*," and in view of the fact that Bayley is only 11 years of age it is a very good effort. The model is built from Meccano parts and a few Aeroplane Constructor parts combined, the latter being used mainly in the construction of the fuselage and for the wing tip floats and engines.

E. Atherton succeeded in building a sturdy model of a Bristol "Blenheim" but unfortunately this is spoilt by the fact that the wings are not of the correct outline. In other respects, however, the model is well built, and is a quite good representation of its prototype.

Among the entries winning smaller prizes, one of the most interesting is a model of a Stearman Hammond "Flying Tricycle" built by B. Luggett, Liverpool 17. This is one of the many planes that have been constructed in an effort to produce a foolproof type of machine, and it has many unorthodox features. The tail unit is mounted on two booms secured to the wings, and the propeller is of the pusher type. A tricycle type undercarriage under the cabin is said to provide an unusually safe landing gear, and it is from this feature that the machine's name is derived.

The details of Luggett's model are good, but his work tends to be rather scrappy, and it is this fault that prevented him from gaining a larger prize.

Peter Laws, Bedlington, Northumberland, submitted a model of a high wing twin-engined monoplane. The model possesses several good constructional features, including a neat shock-absorbing landing gear, but as it is not based on any actual machine it lacks some of the interest of the other entries.

"Small Outfits" and "Suggestions" Model-Building Contests

The principal prize-winners in the "*Small Outfits*" and "*Suggestions*" Competitions, details of which were announced in the March issue of the "*M.M.*" are as follows:

"SMALL OUTFITS" CONTEST

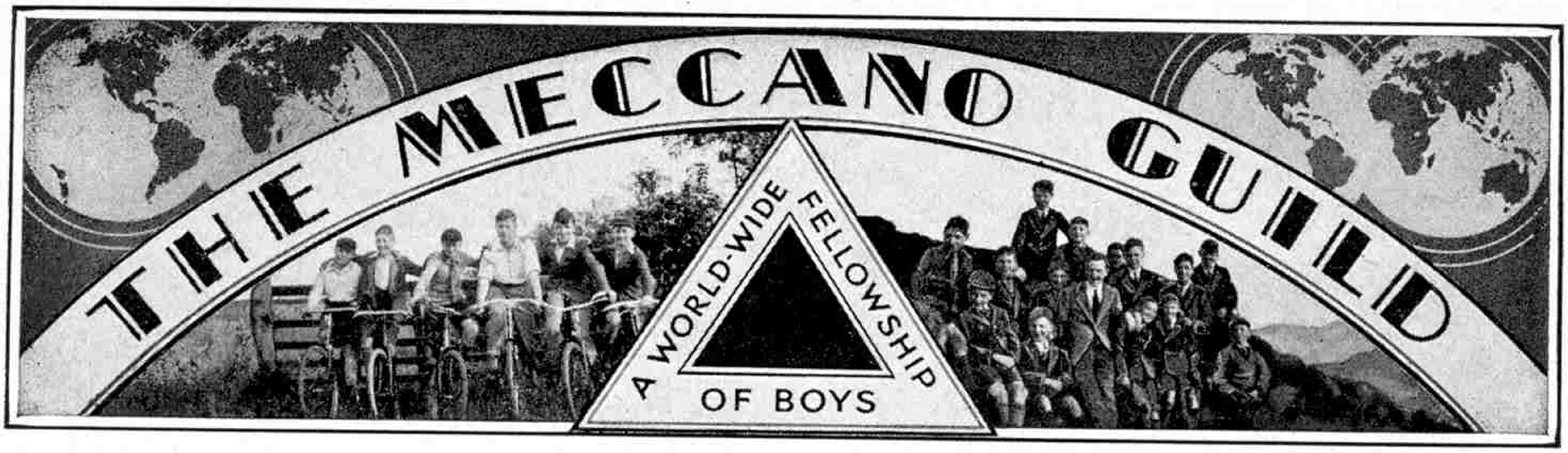
Home Section. 1st Prize, Meccano or Hornby products value £2/2/–: D. Parsons, Birmingham. 2nd, products value £1/1/–: D. Aitken, Rugby. 3rd, products value 10/6: R. Wardrop, Cumnock.

Overseas Section. 1st Prize, Meccano or Hornby products value £2/2/–: J. Lange, Stirling West, South Australia. 2nd, products value £1/1/–: D. Hutt, Hamilton, New Zealand. 3rd, products value 10/6: R. Hutton, Hango, Finland.

"SUGGESTIONS" CONTEST

Home Section. 1st Prize, Meccano or Hornby products value £3/3/–: A. Jones, Liverpool. 2nd, products value £2/2/–: B. Davies, Birmingham. 3rd, products value £1/1/–: V. Carter, London, E.5.

Overseas Section. 1st Prize, Meccano or Hornby products value £3/3/–: E. Siniscalco, Buenos Aires. 2nd, products value £2/2/–: L. Edwards, Freeman's Bay, Auckland. 3rd, products value £1/1/–: P. Giese, Buenos Aires.


THE MECCANO GUILD
A WORLD-WIDE FELLOWSHIP OF BOYS

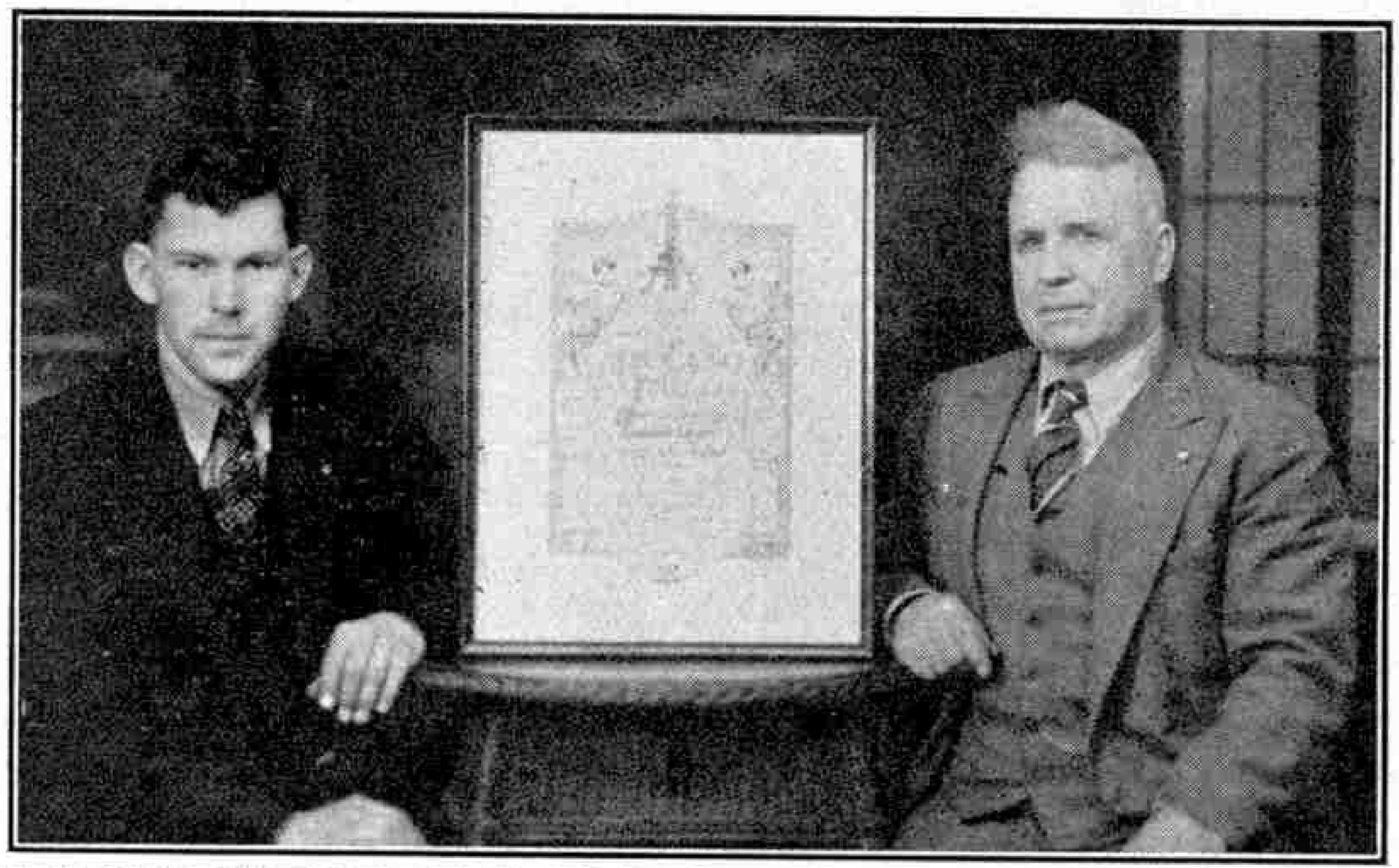
Preparing for the Winter Sessions

Arrangements should now be in hand for the general meeting that usually is held during September to discuss the programme. A talk on what shall be done gives Leaders the best opportunity of learning the wishes of members, who should be encouraged to express their opinions of features of past meetings, or to suggest new ones. Notices of the date of the meeting should be sent out as early as possible in order to ensure that members shall have plenty of time to make arrangements to attend, and every effort should be made to impress upon them the necessity for their presence in order to give the winter sessions programme a good send off.

Secretaries should make sure that they have in hand a good supply of Report Forms, Membership Cards and Subscription Cards. Where supplies are needed I should be informed at once in order that I may have them sent off. I shall also be glad to forward supplies of Guild Leaflets and other literature for the use of members and their friends, especially of newcomers.

How to Obtain New Members

This brings me to the question of recruiting, which is of outstanding importance at this season of the year. New members of course may join at any time, but if they are to obtain the greatest benefit from their association with a club they should begin at a time like this, when members are returning with renewed enthusiasm.



On the right of this photograph is Mr. J. T. Favelle, President of the Rosemount (Regina) M.C., an enterprising Canadian club. With him is J. Watson, secretary and treasurer. The club was affiliated in August 1932. Members have a splendid model-building record, and the club possesses a model railroad, a library and a museum of Indian relics and other interesting curios.

There are many ways in which recruits can be obtained. One is to write to members of the Guild in the neighbourhood who have not yet joined the club, or to visit them. I am always glad to give the names and addresses of such members.

Apart from this, the exhibition of neat and attractive posters or notices in the window of a Meccano dealer, or in some suitable position inside his premises, is helpful. Dealers generally are ready to assist in this manner, but should not be asked to display small unattractive ill-written notices. Care should be taken to have an artistic card printed, or written by somebody with special qualifications for such work, and if this is in colours it will be the more effective. A small advertisement in a local newspaper also often is useful, and a news paragraph is better still.

Probably the best of all methods of recruiting is the personal one. The finest advertisement for a club is a contented member, and he can best explain to other boys what fun is enjoyed at meetings. This should be pointed out to the members themselves, and they should be urged to seek out among their friends recruits who are likely to become useful members, and to bring them along to see for themselves. A new member introduced in this manner usually feels thoroughly at home from the very moment of admission.

In many clubs the Leader himself contrives to visit prospective members, and if he is unable to do this he delegates the mission to another responsible official or to one of the older members. I like this plan, which has the advantage of interesting parents of prospective members in the club their boys are being urged to join.

Look Up Old Friends

I should like to see Leaders making a determined effort to recruit old members. This sounds like a contradiction in terms. What I have in mind is that practically every club has on its roll of members boys who formerly were very active, but who for some time have failed to turn up at meetings. Now is a good time to find the reason for their defection, and to make efforts to bring them back again. This is a task that the Leader might well reserve for himself, except in the cases of boys who have particularly close friends actively associated with the club.

It may be that there has been a temporary lack of enthusiasm, which can be renewed by a timely word, or perhaps some little event or change in the programme has not been to the liking of the old member, who may now be ready to reconsider his decision, while of course items to which he objected may have been discontinued. Whatever the reason, a friendly talk will probably awaken memories of happy times, and the club then will benefit by the acquisition of a member who knows something of its traditions and is of greater immediate value than an ordinary recruit.

To me it seems as important to keep old members as it is to obtain new ones. Even if work or other activities prevents their regular attendance at meetings, it is worth while to keep in touch with them and to retain their interest.

* * * *

I wish to remind club officials of the list of club magazines that I am now preparing. Those who have not yet sent me details of their publications are asked to do so at once, and this also applies to the Chairmen of Branches of the H.R.C. The details I wish to have include the name of the magazine, the number of the pages, the price and the method of production employed, together with information in regard to the organisation of the editorial staff.

Proposed Clubs

Attempts are being made to establish Meccano Clubs in the following places, and boys interested should communicate with the promoters, whose names and addresses are given below:

SHEFFIELD—C. H. Pearson, 67, Taplin Road, Sheffield 6.
SOUTH AFRICA—J. De Villiers, "Dunrobin," Camps Bay, Capetown.
SWINDON—Mr. A. Richards, 118, William Street, Swindon, Wilts.
TAUNTON—G. Boby, 26, Station Road, Taunton, Somerset.
TAUNTON—C. Templeman, 59, Addison Grove, Taunton, Somerset.
WOLVERHAMPTON—Mr. G. S. Stevens, St. Peter's Collegiate Church School, St. Peter's Square, Wolverhampton.
LONDON—F. T. Whitehouse, 190, Streatham Vale, Streatham, London S.W.16.
HORSHAM—Mr. S. Piggott, Jireh, Highlands Road, Horsham.
CHATHAM—W. Hudson, 200, Dale Street, Chatham, Kent.
INDIA—K. Omar, Nili Chatri, Aligarh (U.P.) India.
TRANSJORDAN—G. H. Khair, Amman, Transjordan, Via Palestine.
BATH—J. L. Shutter, 75, Lower Oldfield Park, Bath.

CLUB NOTES

St. Stephens (Saltash) M.C.—Outdoor meetings have been favoured during the recent warm weather. The Model-building Section has held several meetings, however, and steady progress is being made in constructional work. An unrehearsed test of the strength of Meccano parts took place when a member sat rather heavily on a model! Several Darts Matches have been played. Members are looking forward to the recommencement of activities after the summer holidays. Club roll: 8. *Secretary:* B. Braund, 9, Homer Park, Saltash.

Old Charlton M.C.—An interesting programme is being followed. At one meeting several good model combination locks were constructed, one or two being quite efficient in practice. On a "Simplicity" Model Evening originality was the chief feature required. An interesting talk on "*The River*" has been given by Mr. F. Ambrose. A lively Debate took place on the motion "*Pets Are a Nuisance*," proposed by A. Brown and opposed by D. Fish. Club roll: 36. *Secretary:* F. J. Ambrose, 72a, Charlton Road, Blackheath, London S.E.3.

Mall School M.C.—Meetings have been well attended, in spite of the outdoor attractions of the light summer evenings. Many interesting models were built and entered in a club contest, a Drawing Competition held at the same time also producing some excellent work. A General Knowledge Test was held at one meeting, the club being divided into three teams for this purpose. Proceedings at a Mock Trial commenced on one evening became so involved that the case had to be adjourned and completed at a later date. Club roll: 32. *Secretary:* A. C. James, 45, Popes Grove, Twickenham, Middlesex.

The Beeches (Jersey) M.C.—School holidays have restricted the number of meetings during the summer session. Visits have been paid to the Jersey Gasworks, and the Observatory at Maison St. Louis. The publication of the club magazine, "*Our Mag*," is progressing satisfactorily. Lantern Slides on varied topics proved of interest to all when shown recently. Club roll: 28. *Secretary:* D. Nicolle, La Colomberie, 36, Colomberie, St. Helier, Jersey, Channel Islands.

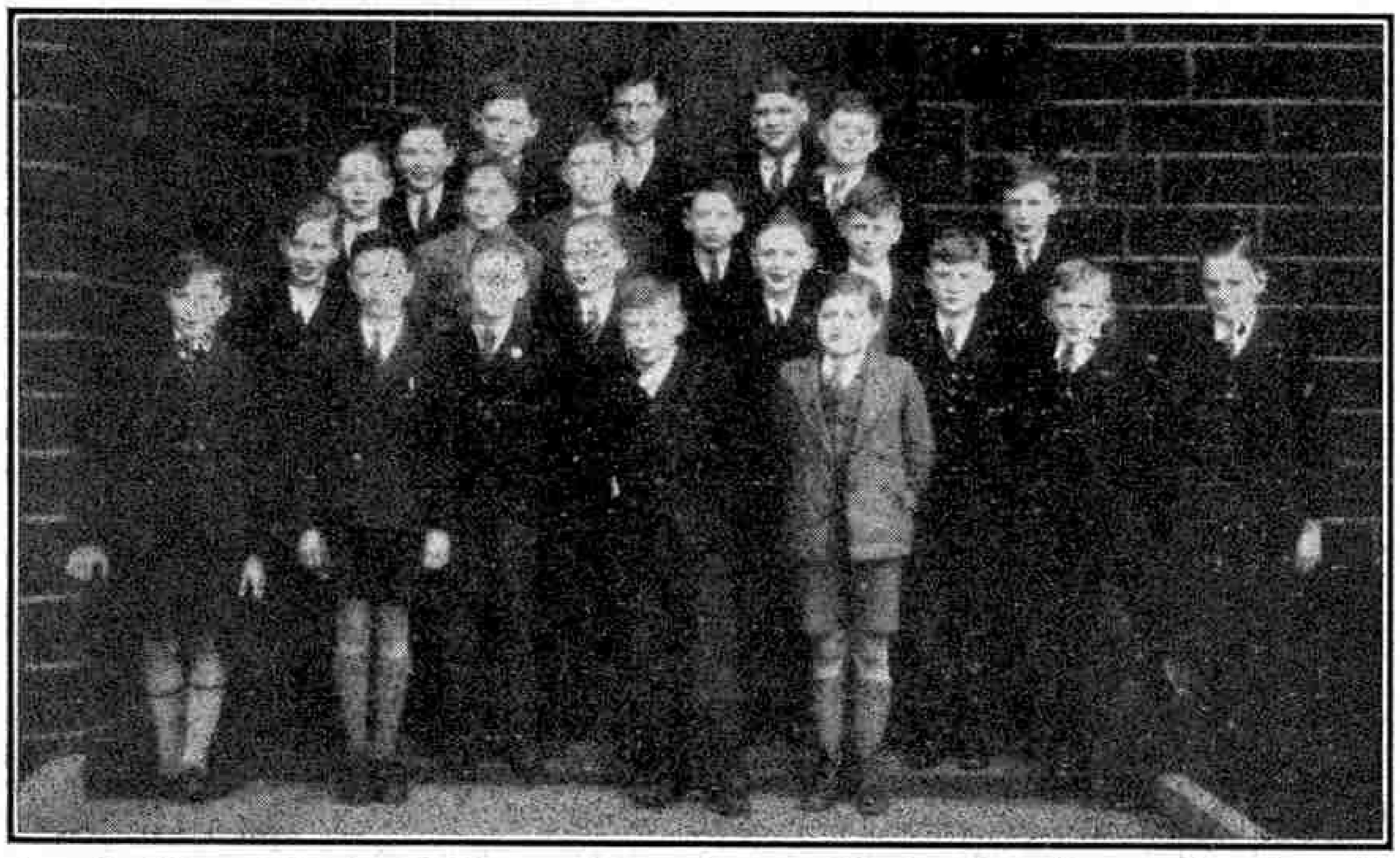
Stretford Public Libraries M.C.—Attendances have been satisfactory in view of the calls made upon members by summer sports. The many good models brought to meetings have included two types of racing car, each complete with steering gear and having unusually smooth running. A three-wheeled motor car struck a new note in model-building, while such old favourites as the grain elevator, railway engine and crane were subjects of other well-built models. Games have been played. Members of the Stamp Section have had keen discussions on certain stamps, and it is proposed to hold an Exhibition to encourage neatness in the writing up and keeping of albums. Club roll: 35. *Secretary:* Miss F. Scattergood, Public Library, Technical Institute, Stretford Road, Old Trafford, Manchester 16.

Wednesbury M.C.—Social events have formed a prominent part of the summer programme. An enjoyable afternoon was spent at the Birmingham Telephone House. Members won a Darts Match played against the President and Vice-Presidents. Several Games Nights have been held, the chief pursuits being Table Tennis and Darts. An extensive recruiting campaign is being organised, and no definite programme for the future will be drawn up until this has been put into effect, and the results are known. Club roll: 10. *Secretary:* M. L. Done, 31, Waverley Road, Darlaston, Wednesbury, Staffordshire.

Exeter M.C.—The club grows from strength to strength, for again a new record for the number of models built in a month has been set up. Quantity has not been attained through sacrifice of quality, however, for many ingenious models were built and a high all-round standard was maintained. The club is looking forward to a very successful winter session, with increased membership and attendances. Club roll: 30. *Secretary:* J. Fenwick, 45, Calthorpe Road, Exeter.

Barnard Castle School M.C.—Interesting activities with Dinky Toys have been a feature of recent club meetings, and a special Dinky Toys Section is to be formed in the winter term. The clubroom has been given a thorough cleaning. Preparations are being made for a forthcoming Exhibition, in which Dinky Toys and Hornby Train operations will figure prominently. Club roll: 9. *Secretary:* K. R. Southern, The School, Barnard Castle, Co. Durham.

Hornsea M.C.—A revision has been made in the list of officials, P. Richardson becoming secretary, and K. Rockingham replacing him as Engineer. The usual varied programme has been followed, this including Hornby Train Evenings, Games Evenings and Cinema Shows. A talk has been given on "*Architecture.*" Club roll: 14. *Secretary:* P. Richardson, "Summerleigh," Esplanade N. Hornsea.



An active Meccano club is maintained at Burnley Grammar School, and members are shown here. The Headmaster, Mr. J. C. E. Wren, M.A., B.Sc., is President. Mr. J. S. Hey, M.Sc., very efficiently fulfils the position of Leader, and the secretary is L. H. C. Hawkins. The club was affiliated in January 1936, and follows an interesting programme in which the chief features are Model-building and Lectures, which usually are given by masters of the school.

Islandmagee M.C.—A recent Games Evening was a great success. Quoits and other games were played simultaneously, the members being grouped into three sections for the purpose. Mr. J. Hunter, President, kindly acted as "timekeeper." A Quoits Contest between the junior and senior sections proved very exciting, with many changes of fortune. A recent Cricket Match was followed by an excellent supper kindly provided jointly by Mrs. Hunter and the club committee. A delightful week was spent in camp at Ballyhempton, members doing their own cooking and cleaning. The club magazine, "*The Gazette*," has been enlarged to six pages and is now a printed publication. In future it will be published quarterly. Club roll: 19. *Secretary:* S. McCready, "Hillmount," Islandmagee, Co. Antrim.

Barking M.C.—At a meeting devoted to reviewing club expenditure during the past year Mr. Weightman, the Leader, suggested an "insurance" scheme, whereby each member would annually pay a stated sum to offset losses and breakages of equipment during club meetings. During June and July indoor meetings were suspended, and Cricket and Swimming were indulged in every week. The syllabus for the first Winter Session has been arranged. Model-building and Hornby Railway operations will be carried out every three weeks. An outing is to be held this month. Club roll: 26. *Secretary:* F. K. Whitehead, 60, Devon Road, Barking, Essex.

St. Oswald's M.C.—Regular club work has been suspended during the warm weather, meetings being devoted to billiards, bagatelle, Monopoly and other games. Marks were awarded to the winners. A general discussion of the club programme has been held, when suggestions and criticisms were made by the members. Future plans include Film Shows and a discussion on "*Holidays*." Club roll: 25. *Secretary:* J. F. Jaques, "Elmolino," 5, Ingram Road, Thornton Heath, Surrey.

Folkestone M.C.—The model yacht has been altered and now has longer masts and better sails. A model motor yacht 20 ft. long is to be built. It will be a very light craft, and will be used on days when there is not sufficient wind for the sailing yacht to be used. The Leader and a friend recently witnessed a display by the Folkestone Model Aeroplane Club, and saw many successful models in flight. The club funds are increasing slowly. Club roll: 7. *Secretary:* W. F. Cotter, 52, Hill Road, Folkestone, Kent.

AUSTRALIA

Melbourne M.C.—At one meeting the working of a new 3-position colour light signal was demonstrated. On another occasion photographs of the model railway of Mr. Lumsden, Camberwell, were shown to the members, who were so impressed that it was decided to arrange to see the railway in operation. A visitors' schedule of train movements was carried out for the benefit of three visitors to the meeting. A visit was paid to the International Motor Show, where members saw the excellent display staged by the Victoria Model Railway Society. A passenger and a goods train were run alternately with full sound effects produced by a member of the Society, and films of model railways in the Melbourne district were shown at regular sessions. A party of members recently visited the "O" gauge electric railway of Mr. Pearson, of Richmond, whose rolling stock includes four Hornby electric locomotives. Seven of the new air-conditioned speed controllers are now in use on the club Hornby layout, and they give effective control of both 6-volt and 20-volt trains. Other controllers are nearing completion. Club roll: 10. *Secretary:* Leonard Ison, 8, Hayes Street, Northcote, N.16, Victoria.

EGYPT

Zagazig and Misr M.C.—Primary members have been engaged in the construction of various types of battleships, while the Secondary Section have concentrated on mechanical models incorporating different kinds of belt drives. The models built include lathes, drilling machines, and other machines to be found in factory machine shops. A number of radio parts presented to the Wireless Section have increased the equipment available for practical work. The Social Evenings organised by the various sections of the club have all been greatly enjoyed. A further number of the club magazine, "*Mechano*," has been issued. Competitive games have been played against the Zeitoun Friends Club. Several Rambles have been enjoyed, other outdoor activities including regular visits to a local swimming pool. Club roll: 22. *Secretary:* A. S. Mangourie, 13, Sharia Badir, Zeitoun, Cairo, Egypt.

NEW ZEALAND

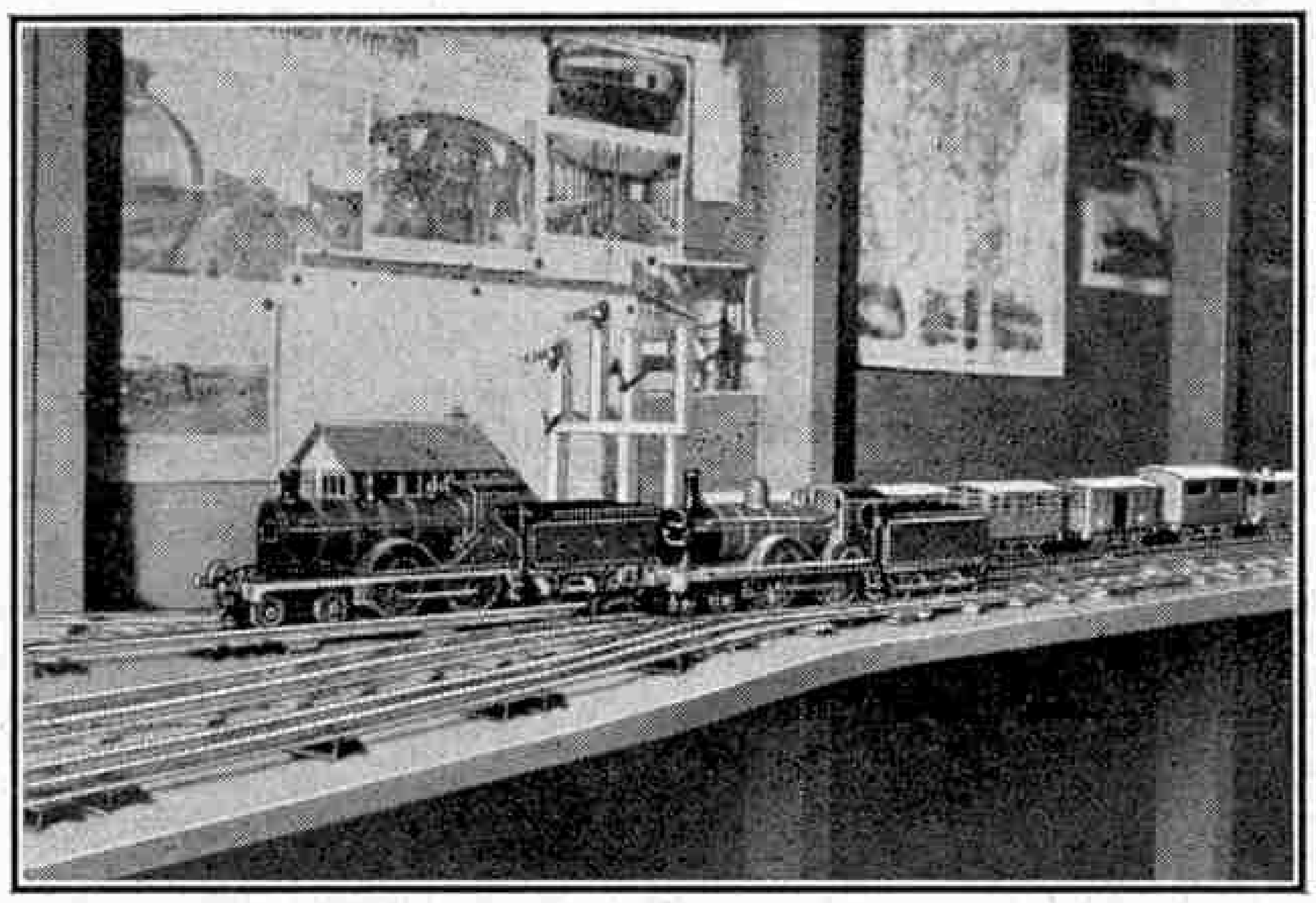
Christchurch M.C.—The Annual Social of the club proved a splendid success, the operation of a Hornby electric layout and the working of a number of Meccano models attracting much enthusiastic attention among visitors, who consisted chiefly of parents of members. Representatives from the Ashburton M.C. brought along their entries for the Inter-Club Shield Competition. The judging for this was carried out during the evening, and eventually the Shield was won by Ashburton by a very small margin. The judges commented on the very high standard attained by the model-builders. Mr. R. H. Handisides has given a very interesting talk on the "Rimu" Gold Dredge. Club roll: 37. *Secretary:* S. S. Stringer, 250, Oxford Terrace, Christchurch C.1., New Zealand.

An Interesting Irish G.N.R. Layout

Dublin-Belfast Main Line in Miniature

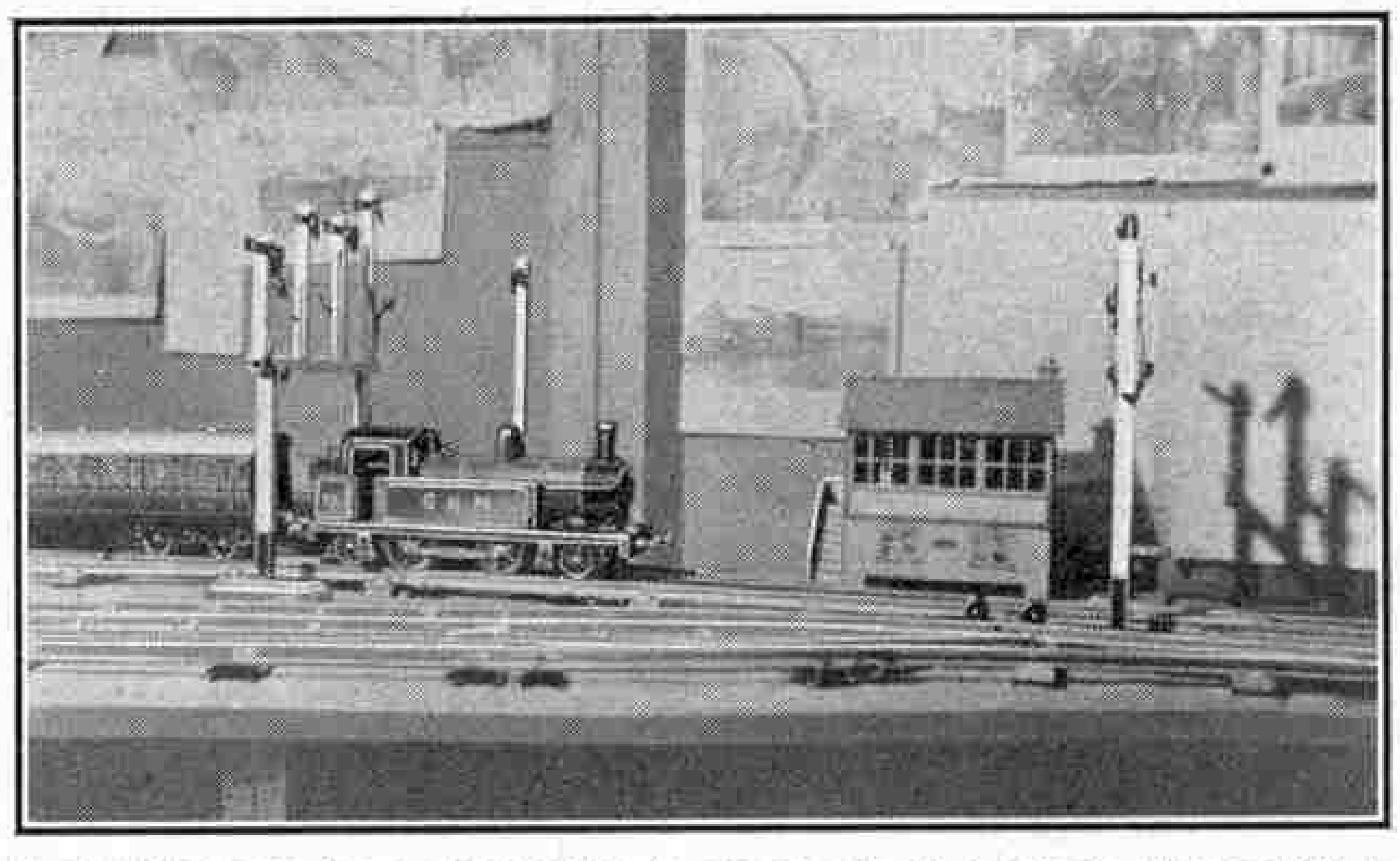
IN the *"M.M."* for May 1937 we described a layout representing the main line of the G.N.R. of Ireland. This was then operated by an enthusiastic "Company" inspired by A. Donaldson (H.R.C. No. 6868). Soon after the description appeared the line was dismantled, but a new G.N.R. system operated on similar principles has since been installed by Donaldson and R. O'Sullivan, his chief assistant in the conduct of the original line. This new system incorporates various developments and improvements on the old one, and the following account of the present state of the line will be of interest.

The old layout was arranged on the floor in a semi-permanent manner, having to be taken up from time to time; but the present system is permanently installed. The track is laid on a baseboard raised on trestles to a height of about 3 ft. so that operations are carried out far more easily and efficiently than was possible before. The line is non-continuous, and represents the track of the real G.N.R. between Dublin and Belfast, trains being worked between the two termini in an interesting and realistic manner. The intermediate passing station represents Portadown, an important junction in real practice.



A cattle special on the layout described on this page. The engine is a 4-4-0 No. 24; another 4-4-0, No. 43, is standing alongside.

The interest of the operators is not confined to important expresses, and a complete service of main line and subsidiary trains, both passenger and freight, is run. All trains are operated according to timetables, for which the non-continuous character of the layout is specially suited. Actually in a period of 3 hr. about 70 trains are run! Approximately half this number are local trains, which run either from "Dublin" or "Belfast" to "Portadown" and back. Although the total length of the main line is comparatively short—about 50 to 60 ft.—this is not a disadvantage with operations of the kind that are carried out. All the important services on the real G.N.R. system are represented, and a point of special interest is that they are run with locomotives and rolling stock resembling as closely as possible those employed in actual practice.



A stopping train leaving "Dublin" in charge of a 2-4-2 tank. This engine is employed mainly on short-distance traffic.

Some of the stock operated on the old line is still in service, but further additions have been made, the "Locomotive Department" proving as ingenious and active as ever in adapting standard models for their own special purposes. Three of the locomotives are shown in the accompanying illustrations. In the upper photograph a train representing a brake-fitted special, conveying cattle, is entering "Dublin" hauled by a 4-4-0 No. 24. This engine is of home construction, and follows closely the outline of the real No. 24, which belongs to G.N.R. Class "QL" built in 1909. The smart appearance of the locomotive will be noted; this is due to the fact that, like most of the other passenger engines on this miniature system, it is finished in the brilliant shade of blue employed on the real G.N.R. for the five Compound 4-4-0s Nos. 83-7. The use of this colour for other classes as well is a form of miniature railway license that is certainly justified by the smart appearance of the engines.

For most of the locomotives Hornby clockwork mechanisms have been used, and the motor of No. 43, the locomotive standing in the siding in the upper photograph, is one of the now obsolete No. 2 pattern. It is still giving splendid service, and on one occasion when on test it dealt successfully with a train of eight bogie coaches. The engine shown in the lower illustration is a 2-4-2 tank that incorporates a Hornby No. 1 Special mechanism.

In order to ease the task of the locomotives, which is a matter of importance on a clockwork system, the baseboard has been made as level as possible and the rails have been carefully screwed down. On this miniature G.N.R. the most difficult part of the road is the start out of "Belfast," where trains have to negotiate nearly a half circle of 2 ft. radius curves.

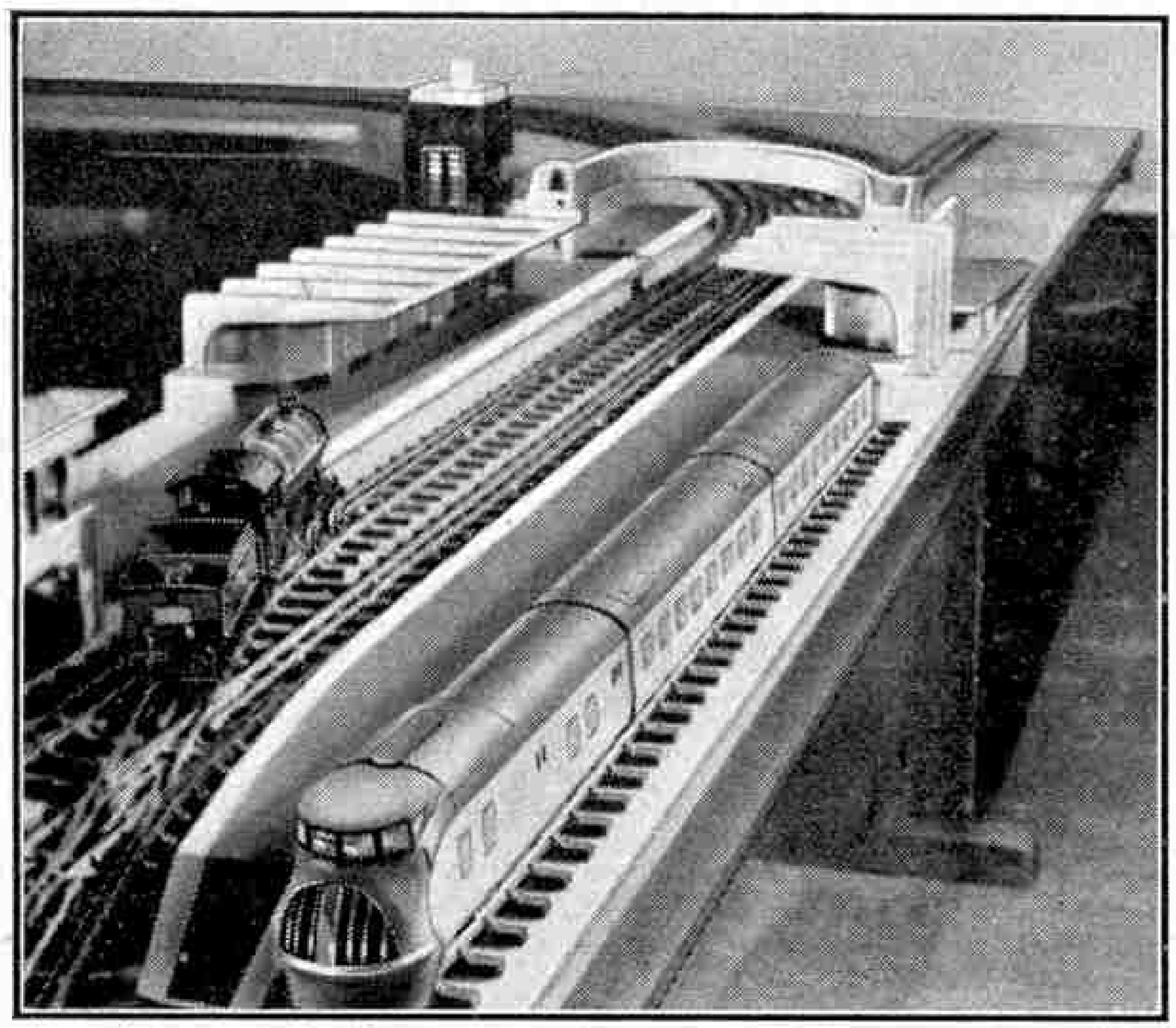
Through coaches for different destinations, such as "Derry," "Warrenpoint" and "Cavan," are conveyed by the main line trains, and some heavy loads are taken. The coaches in use number 20 of bogie type, and there are eight Hornby No. 1 four-wheelers. The bogie stock includes Hornby No. 2 compartment type Passenger Coaches, and also several of the latest No. 2 Corridor Coaches.

There are about 30 or 40 goods vehicles, chiefly of Hornby types. All of them have been re-lettered to represent stock of the various railway systems of Eire and Northern Ireland, and their presence gives quite a cosmopolitan air to the system that is in keeping with actual practice. The real G.N.R. is truly an international line, main line trains crossing the border on the run between Dundalk and Goraghwood Junction.

A Well-Equipped Electric Branch Layout

The System of the Edinburgh Hobbies Club

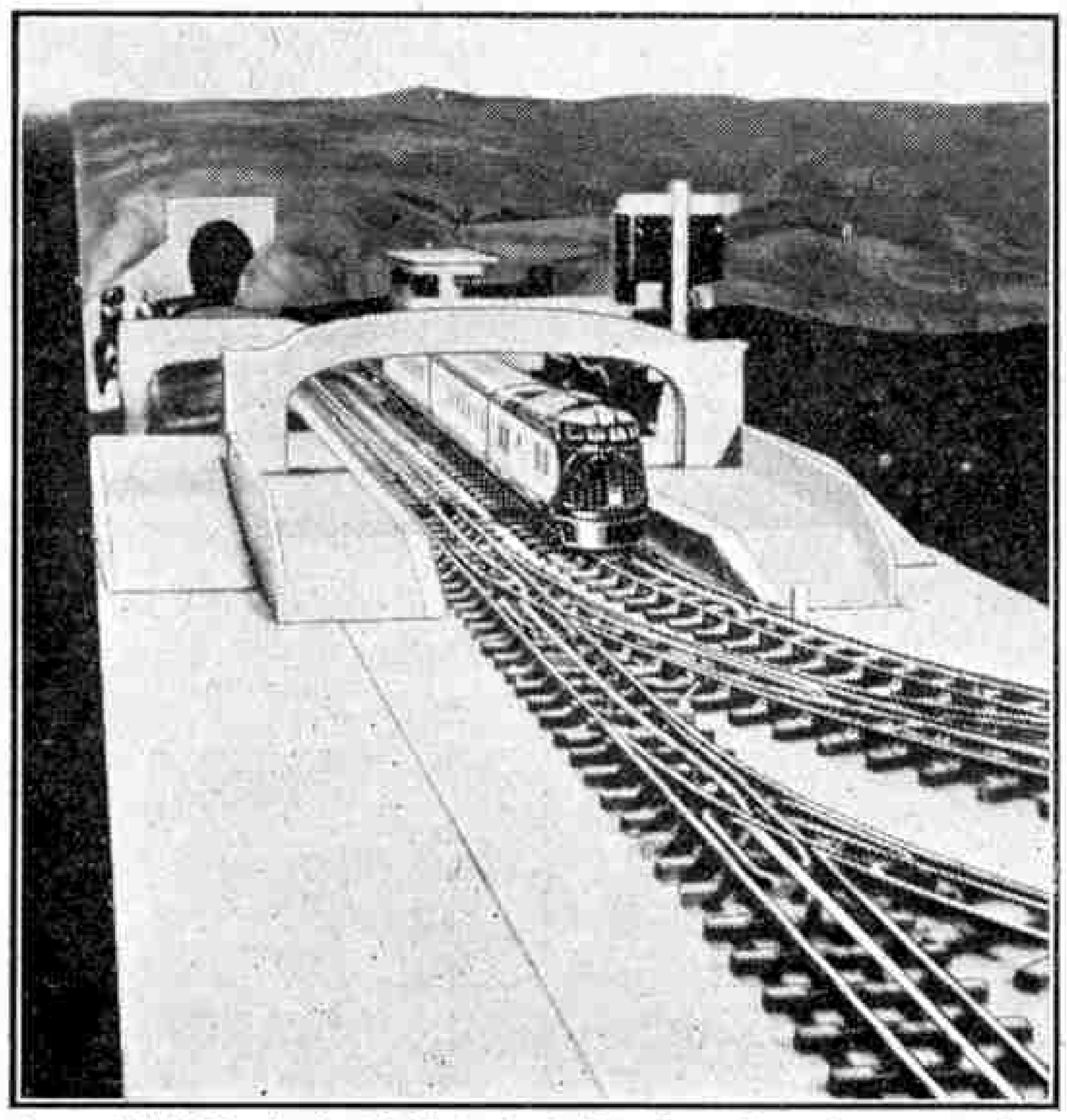
ARTICLES describing the model railway systems of individual enthusiasts are a popular feature of the "*M.M.*" and frequently schemes of working that we describe are adopted by others. Details of H.R.C. Branch layouts are of special interest to other Branches and in May last we published an account of the excellent system operated by the Bedford School Branch No. 310. This month we describe the electric layout operated by the Edinburgh Hobbies Club, which is affiliated as a Meccano Club and also is incorporated as H.R.C. Branch No. 338. The club claims that it is the first of its kind in existence of which the members are able to indulge in all kinds of hobbies. A separate room is devoted to each hobby, and the railway room is the most popular of these.



"Lauriston Junction," on the layout of the Edinburgh H.R.C. Branch No. 338. The modern architecture of the station buildings, which have been designed and built by Branch members, is a notable feature.

The railway occupies a space 20 ft. by 16 ft. It was begun in November 1937, and the track actually is still under construction at the time of writing. The layout consists primarily of an oval and there are four stations. These are respectively, "Central," which is the main terminal station situated inside the main oval, "Hatton" and "Lauriston Junction," both intermediate stations on the main line, and a branch terminus, which has been christened "Buggleskelly." "Hatton" and "Lauriston Junction" have terminal bays as well as through platforms. Hornby Electric Locomotives provide motive power, and current is supplied through two Meccano Transformers, of the T20A and T20 types respectively.

Readers will probably gain a more comprehensive idea of the design of the layout from a brief description of a run by one of the trains. Let us accompany a train leaving "Central" and following the main line in a clockwise direction. On this trip it runs through "Lauriston Junction" and makes its first stop at "Hatton." From there the train proceeds round the oval again to "Lauriston Junction," this time making a stop, when coaches for "Buggleskelly" can be detached, and finishes its run in the terminal bay at "Hatton Station." From this it will be apparent that terminal to terminal working is practised, although the main line is of the continuous type.



A model "Diesel-electric" train built of cardboard at a station. The train is powered by a Hornby Locomotive motor.

For the return journey from "Hatton" another engine takes charge. This is supplied from the Motive Power Depot, which is situated centrally in such a position that it serves both "Hatton" and "Central" stations.

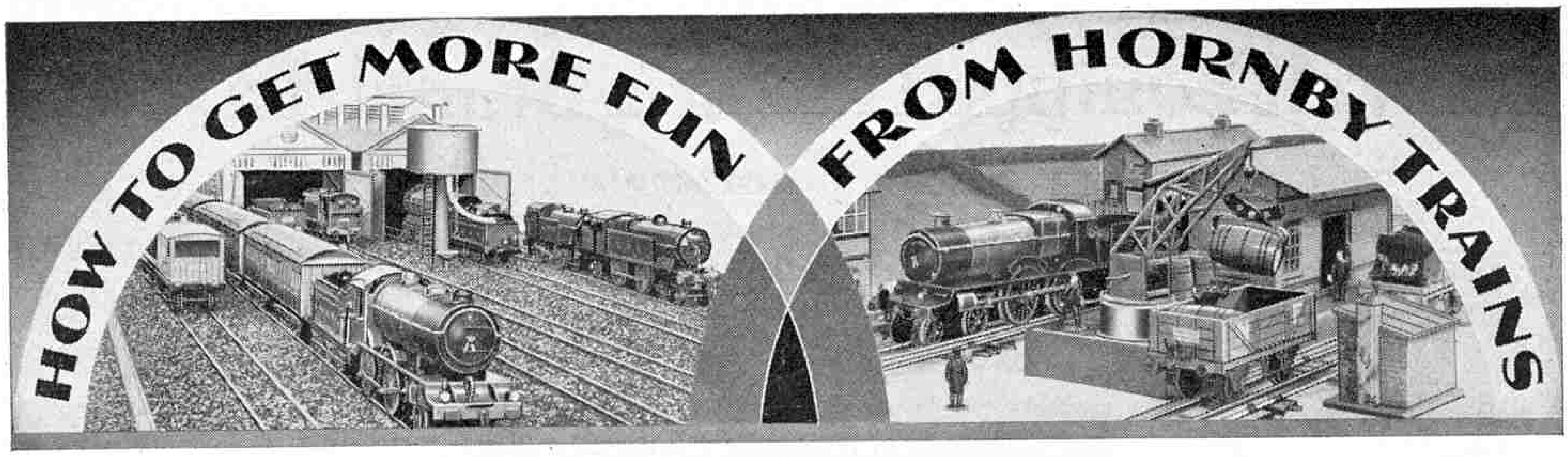
Goods services are to be operated later, but it has not yet been possible to attempt anything in this direction, as the terminal goods yards have not yet been completed.

The work in hand at the moment is the construction of stations, signal and point control schemes, and scenery. Everything required is being made in the club rooms by members, and the stations, signal boxes, and other buildings are all of very modern design. They are constructed largely of plywood cut out on a fretsaw machine, and are finished off to represent reinforced concrete. As will be seen from the illustrations, which show "Lauriston Junction," they are very realistic in appearance.

All the locomotives in use are electrically operated, and in order to make realistic operations possible the track has been sectionalised, controls for the sections being grouped into three sets of switches at "Central," "Hatton" and "Lauriston Junction." The "Hatton" control also deals with the Motive Power Depot. "Lauriston" control panel is already completed, and the portion of track that it controls was on exhibition for a time last month in the Scottish Pavilion, Youth Section, at the Empire Exhibition at Glasgow. For this purpose a continuous layout was provided by joining the two extremities of the length of scale track with Hornby Tinplate Track. Both switches and points levers were built up out of Meccano Parts.

A special feature of the control panel is the track circuit diagram, which by means of a track circuit arrangement shows the presence of a train in any particular section covered by the diagram. Only one of the running rails is continuous, and this acts as a return for both train and lighting circuits. The other rail is connected in sections to indicating lamps on the panel.

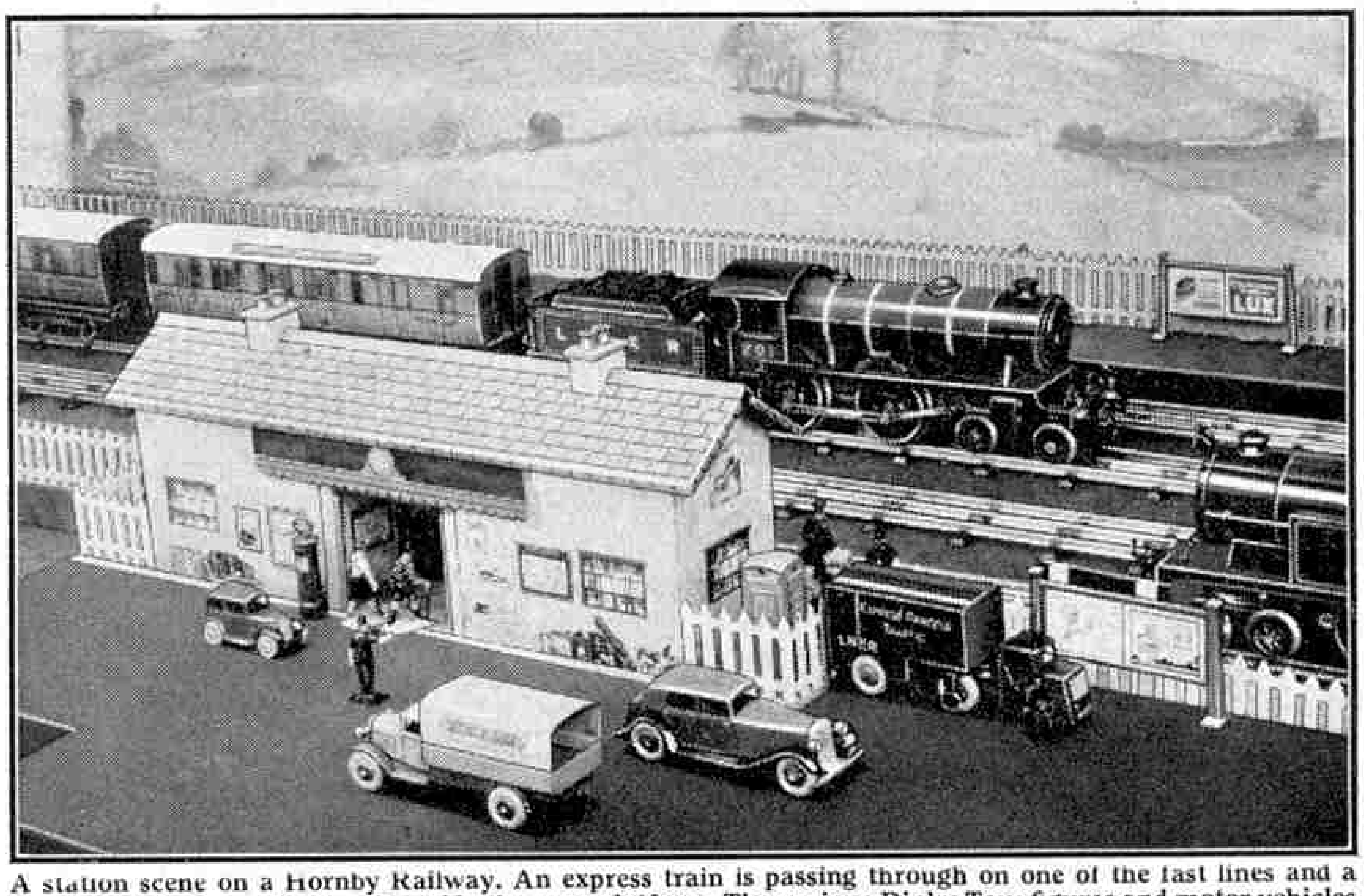
At the Exhibition the work was handled by two E220 L.N.E.R. "Hunt" class Locomotives, an L.M.S. Standard Compound and two tank engines.



ADDING REALISM TO A HORNBY RAILWAY

THE most successful miniature railway layouts are undoubtedly those which are most realistic, not only in appearance but also in working arrangements. This can be achieved by attention to detail, and by the exercise of imagination, that essential quality of any model railway enthusiast. In this article we give a few instances of the splendid effects that a little thought on these lines can be made to produce.

To begin with we may take the general arrangement of a station, a prominent feature of a miniature railway that calls for more attention than is sometimes bestowed on it. It is not sufficient to put down platforms and station buildings in the first spot that catches the eye of the model railway manager. Too often a station is so hemmed in by sidings and loop lines that it would be difficult, if not dangerous, for intending miniature passengers to reach the platform at all! There should therefore be some means of approaching station platforms from the road. The ideal arrangement is to raise the station yard or approach to platform level, as shown in the illustration on this page.



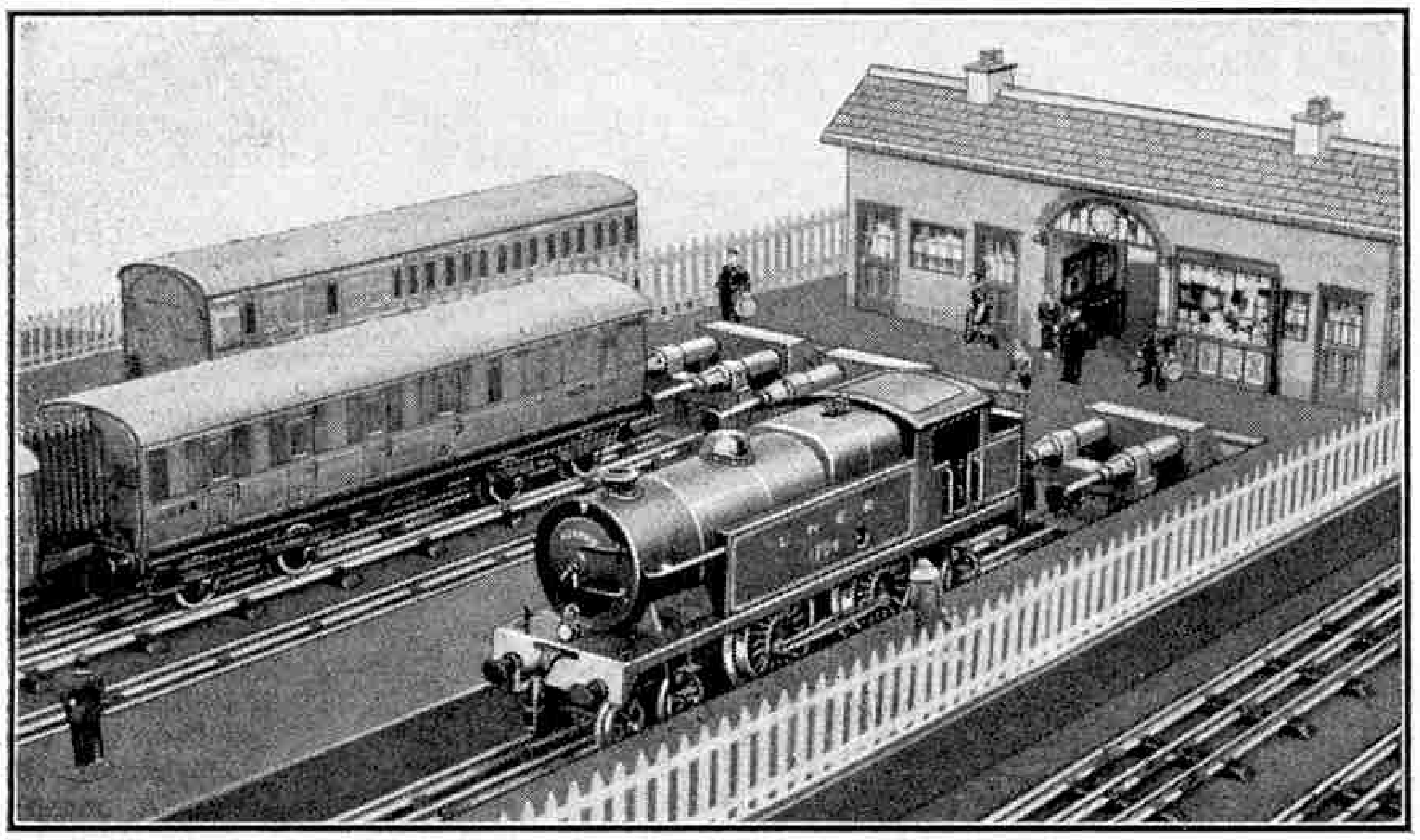
A station scene on a Hornby Railway. An express train is passing through on one of the fast lines and a stopping train is running in alongside the near platform. The various Dinky Toys figures and motor vehicles add considerably to the realistic effect.

A simple scheme that is well adapted to portable layouts is to place a standard Passenger Platform in the rear of the actual station building, keeping the Paled Fencing provided with the Platform on the outer or "road" side. This raised station approach can then be reached from actual ground level by means of the ordinary platform ramps, and if "one-way" traffic is instituted for road vehicles and pedestrians making their way to or from the station a reasonable and realistic arrangement is the result. This scheme has been shown in illustrations in these pages on several occasions. Many variations are possible, according to the space available and the ideas of the individual railway operator, and the pavement sections of Dinky Toys Set No. 46 can be employed very effectively in conjunction with many of them.

An easier but less ambitious scheme is to place an ordinary platform ramp at right-angles to the actual Station platform, thus forming a sloping approach leading straight into the booking hall of the Station building. This method however is not well adapted to the use of road vehicles, which of course are necessary on any well-equipped layout in these days.

Assuming that the station has two platforms, one on each side of the up and down tracks, then some connection between them is necessary. A Footbridge therefore must be provided at one end so that "Passengers must not cross the line except by the Bridge," to quote the familiar notice seen in actual practice. It will now be possible to concentrate the goods sidings and to establish the Goods Platform on the opposite side of the line to that occupied by the passenger approach arrangements. This is a much better scheme than to have sidings on each side of the station, as is often done, for the yard can be more easily worked by the operator. Trains passing one way round the main track will have direct access to the yard, but those going the opposite way will require to cross into the yard by means of Crossover Points. This is quite a common arrangement in real practice, and one that calls for skilful operating in miniature. The goods yard should be enclosed by means of Paled Fencing and a realistic and self-contained station layout will be the result.

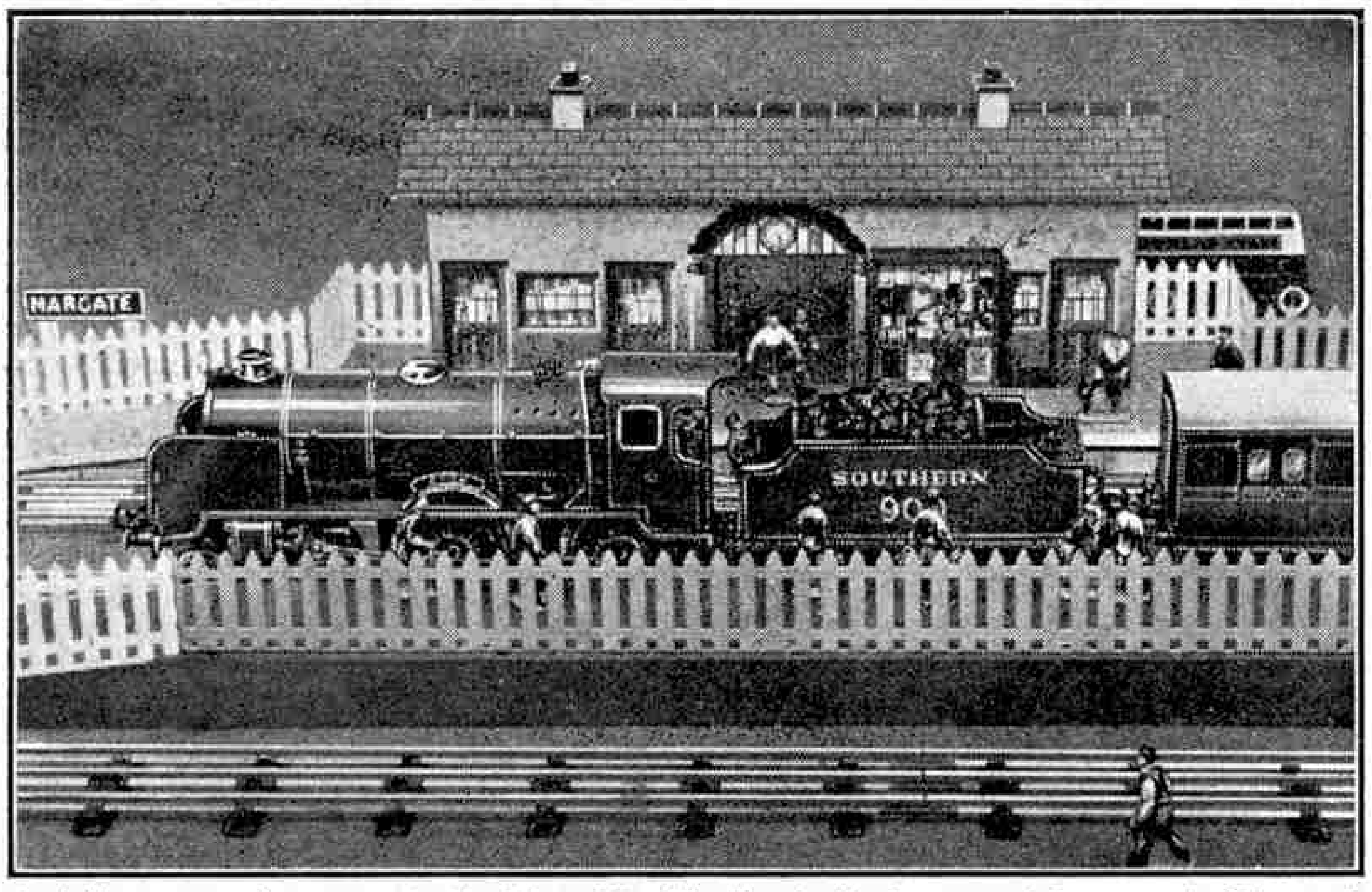
The stations and other railway premises will have an uninteresting appearance unless there is some evidence of the bustle and activity that is characteristic of most stations in real practice. Plenty of "life" can be added by the use of the miniature figures now available in the Meccano Dinky Toys Series. The mere placing of them on the platform in a haphazard manner is not satisfactory, however. Instead the best position for each should be carefully chosen. For example, the Stationmaster, Dinky Toy No. 1A in Set No. 1 of the Series, is the most important of the miniature railwaymen and therefore should not be "lost" in a crowd of other figures on the platform. He can be placed just by the door of his office, or in any suitable position on the platform where he can watch the working of his staff and the conduct of operations generally. If similar attention is given to the use of the other figures the result will be far more realistic than is the case when they are distributed aimlessly about the railway.



A lull in activities at a miniature terminal station. The tank locomotive is ready to move away from the buffer stops, the train that it brought in having been taken out again by another engine.

To add still further to the realism of station platform effects, the components of the various sets of Railway Accessories should be employed. It is not difficult to find appropriate spots for such items as Platform Seats and Automatic Machines, but Luggage should not be scattered in a haphazard manner on the platform. A group of Milk Cans, or a stack of Luggage loaded ready on a Porter's Trolley perhaps, should be placed just opposite the spot where the luggage doors of the Guard's Van or the Brake Composite will be when the train stops at the station.

With regard to trains themselves there are a few details that require attention if the greatest fun is to be obtained from running them. The locomotive should of course display the correct headlamp indication for the class of train that it is hauling. This can readily be arranged now that all except the smallest Hornby Locomotives are provided with lamp brackets for detachable headlamps. There is a great attraction in being able to handle the lamps, and to change their positions if required, just as the train men do on real railways. The indications of the British Standard Headlamp Code are not difficult to remember and the Code is reproduced in the H.R.C. Senior Booklet for the benefit of those who do not know it. Tail lamps must be carried on all real trains and it is possible to provide completeness of detail even in this respect on a Hornby Railway, for the No. 1, No. 2 and No. 2 Corridor Coaches are all fitted with lamp brackets and are provided with correct tail lamps.



A station arranged as suggested in this article. The line in the foreground forms part of the goods yard on one side of the station, while the passenger approach is on the opposite side.

Another train detail that is sometimes neglected is the provision of train name or destination boards. The Hornby No. 2 Special Pullmans and No. 2 Corridor Coaches are provided with brackets for this purpose, and certain other vehicles can be made to carry them by the use of the separate Clips that can be obtained for the purpose. Those operators whose requirements are not covered by the wide range of Hornby Train Nameboards now available can easily make up special boards themselves, as frequently suggested in these articles. It is far more interesting, and of course much more realistic, to operate a miniature express bearing the title "*The Royal Scot*" than to run an express train that carries no indication either of its name or of the stations served. The use of the boards gives the train a definite individuality and sense of purpose.

Another point that should be borne in mind is that locomotive tenders should not run empty. They can now be provided with realistic loads of coal by the use of the Hornby Coal that is now available, and owners who do not wish to carry the coal loose can easily cut pieces of card to fit in the coal space of the tenders. If this card is covered with glue or Seccotine a layer of Hornby Coal can then be spread on and will be retained in position. A similar scheme can be employed for the wagons forming a coal train.

The loading of freight vehicles should be a regular practice. Covered vans that are not provided with sliding doors cannot be loaded, but all open vehicles can be made to carry miniature freight. Suitable material is to hand in the form of Hornby Coal and the miniature Hornby Bricks that have been introduced specially for use with the Hornby No. 2 High Capacity Wagons. In addition there are such items as Meccano Loaded Sacks, the barrels and so on provided with the Barrel Wagon and the miniature hampers of Railway Accessories Set No. 1, and a great deal can be done with the small tins, cartons and containers of various kinds that are found in every household. Some of these can be painted if necessary to make them more realistic for railway purposes.

Open Wagons carrying the Railway Accessories hampers, and any other items that may represent perishable merchandise, should be sheeted over with Hornby Wagon Tarpaulins. A vehicle well adapted to this is the Open Wagon "B," which has a movable bar specially intended for supporting the Tarpaulin clear of the load. The carriage of freight in the wagons and its stacking on the Goods Platform is important in giving an air of business to the line, especially if Dinky Toys figures are so placed that they appear to be handling it.

Branch News

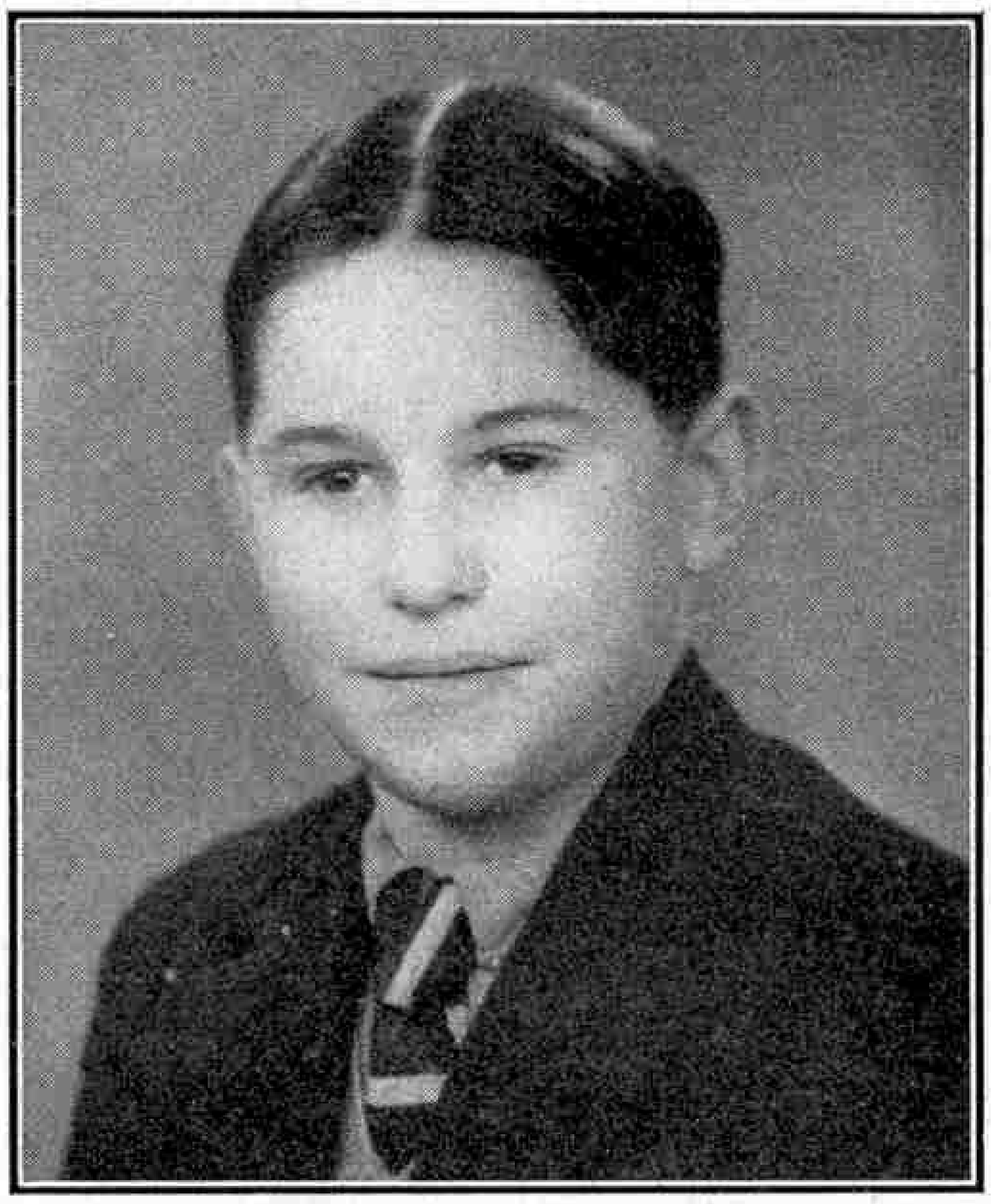
St. Stephens (Saltash).—There were 69 layout designs submitted in a contest to decide the most suitable for Branch purposes, and the one selected is now being laid down with steel and brass electric track. It includes one large terminal and two through stations, and a large marshalling yard; it will incorporate over 100 points and signal levers. Track operations have been carried out from time to time, a marshalling yard being the most popular form of layout. A Parents' Night and a Dance were financial successes and considerably swelled club funds. A 4–4–2 electric locomotive has run successful trials. Games, including several Dart Matches, have been enjoyed. Secretary: B. Braund, 9, Homer Park, St. Stephens, Saltash, Cornwall.

West Haddon.—The Branch room has been completely renovated, and the L.N.E.R. and L.M.S. layouts relaid to an improved design. A fine model of Rugby Station has been built and added to the L.M.S. section, while the L.N.E.R. section are constructing a new bridge to replace that at present at "Newcastle." Visits have been paid to Welton Station on the L.M.S. main line, where the famous expresses seen included *"The Royal Scot,"* hauled by the new streamlined "Pacific" locomotive *"Duchess of Gloucester."* The footplates of several locomotives also have been inspected. An enjoyable afternoon was spent at the Rugby works of the British Thomson-Houston Company, where members saw equipment for the London Underground in the making. Secretary: D. G. Bush, "Stonelea," West Haddon, near Rugby, Warwickshire.

Chorlton-cum-Hardy.—Regular Track Nights have been held, and at one a through coach was run from "Lincoln" to "Holyhead," the *"Irish Mail"* express picking it up at "Crewe." Locomotives and rolling stock have been thoroughly overhauled, resulting in improved running. At one meeting possible layout improvements were discussed. A visit is being arranged to the Railway Signalling School at Victoria Station, Manchester. Secretary: G. H. Gill, 56, Highfield Road, Chorlton-cum-Hardy, Manchester.

Barnard Castle School.—Outdoor activities have occupied the greater part of the programme for the Summer Session, but occasional track meetings have been held. The layouts worked have included wharfs and a quarry, suitable train services being run in connection with them. Realistic loading of goods trains has been carried out at loading platforms. Attention has been turned to preparations for a forthcoming Exhibition. Secretary: K. R. Southern, The School, Barnard Castle.

Elmside (Exeter).—The usual large number of trains have been run at track meetings. Certain evenings are put aside for the junior members, who are becoming more efficient in train operation. At Dinky Toys Evenings held for the juniors a variety of interesting road work has been carried out. It has been decided to take up the Branch track and relay it to a new design. Several points and items of rolling stock that are showing signs of wear will be replaced during the forthcoming alterations. Secretary: J. Fenwick, 45, Calthorpe Road, Exeter, Devon.


K. T. Rogers, secretary of the Crypt School (Gloucester) H.R.C. Branch No. 342 since its incorporation in March. A photograph of members of this enthusiastic club was reproduced on the "Branch News" page last month.

First Sheffield.—Track work is temporarily suspended owing to the changing of the clubroom. All equipment has been thoroughly overhauled and cleaned. An electric 6-volt layout is to be laid down in the new room, and it is eventually hoped to convert it to 20-volt power. Excursions have been made by train, bus, and motor car, and visits paid to the stations at Leeds, Dewsbury, Cleckheaton, Bradford, York, Retford and Newark. At Newark members saw the rebuilt *"No. 10000"* at night, and also caught a glimpse of the *"Yorkshire Pullman"* travelling at high speed. A visit was paid to the Railway Museum at York, and numerous expresses were watched from a point on the main line just north of the station, great interest being taken in the fine acceleration of the new A4 "Pacifics," one of which was drawing 16 coaches. Secretary: W. B. Hutchinson, 11, Sharrow View, Sheffield 7.

Lostock Gralam.—Track operations have been carried out regularly, and a variety of interesting trains run. A series of lectures on air raid precautions are being given. A fine model yacht presented to the Branch is 3 ft. 6 in. long and has a detachable superstructure; an electric motor has been installed in it. A Magazine is to be published. Outings are held nearly every week. A camp was held in North Wales during the recent summer holidays. Secretary: A. P. S. Milligan, Wincham Hall, Northwich, Cheshire.

Purley County School.—Many trains have been run on the Branch clockwork and electric layouts. Lectures have been given on *"The Port of London"* and *"Aeroplanes."* Visits have been paid to a local telephone exchange and to the Headquarters of the London Fire Brigade. Regular Games Evenings have been held. Secretary: L. J. Vaizey, 26, Arundel Avenue, Sanderstead, Surrey.

St. Oswalds.—Very successful train running has been carried out at the weekly Track Nights. A Debate dealt with the possibilities of *"Trolley Buses, Omnibuses and Trams,"* omnibuses being considered the best form of transport. A Mock Trial was organised, the "prisoner" being charged with pushing somebody into the river while at camp! Secretary: R. H. Shaw, 16, Covington Gardens, Norbury, S.W.16.

Everglades.—A visit to the Southern Railway Locomotive Works at Eastleigh proved a great thrill for members, who saw all the various stages in the construction of a giant of the iron road. The cab of a "Schools" class engine was inspected with interest. The afternoon ended with a glimpse of *"The Bournemouth Belle"* gliding swiftly by on her way east. An outdoor track is laid down occasionally and such trains as *"The Irish Mail"* are run. Interest was taken in the work of a breakdown gang engaged in righting a derailed 0–4–4 tank locomotive at Cosham Station. Outdoor meetings are being held regularly during the summer. Secretary: P. D. Stuart, 7, Lodge Avenue, Cosham, Hants.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested and desirous of linking up with this organisation should communicate with the promoters, whose names and addresses are given below.

Bristol—S. Fogg, 25, Wellington Hill, Horfield, Bristol.

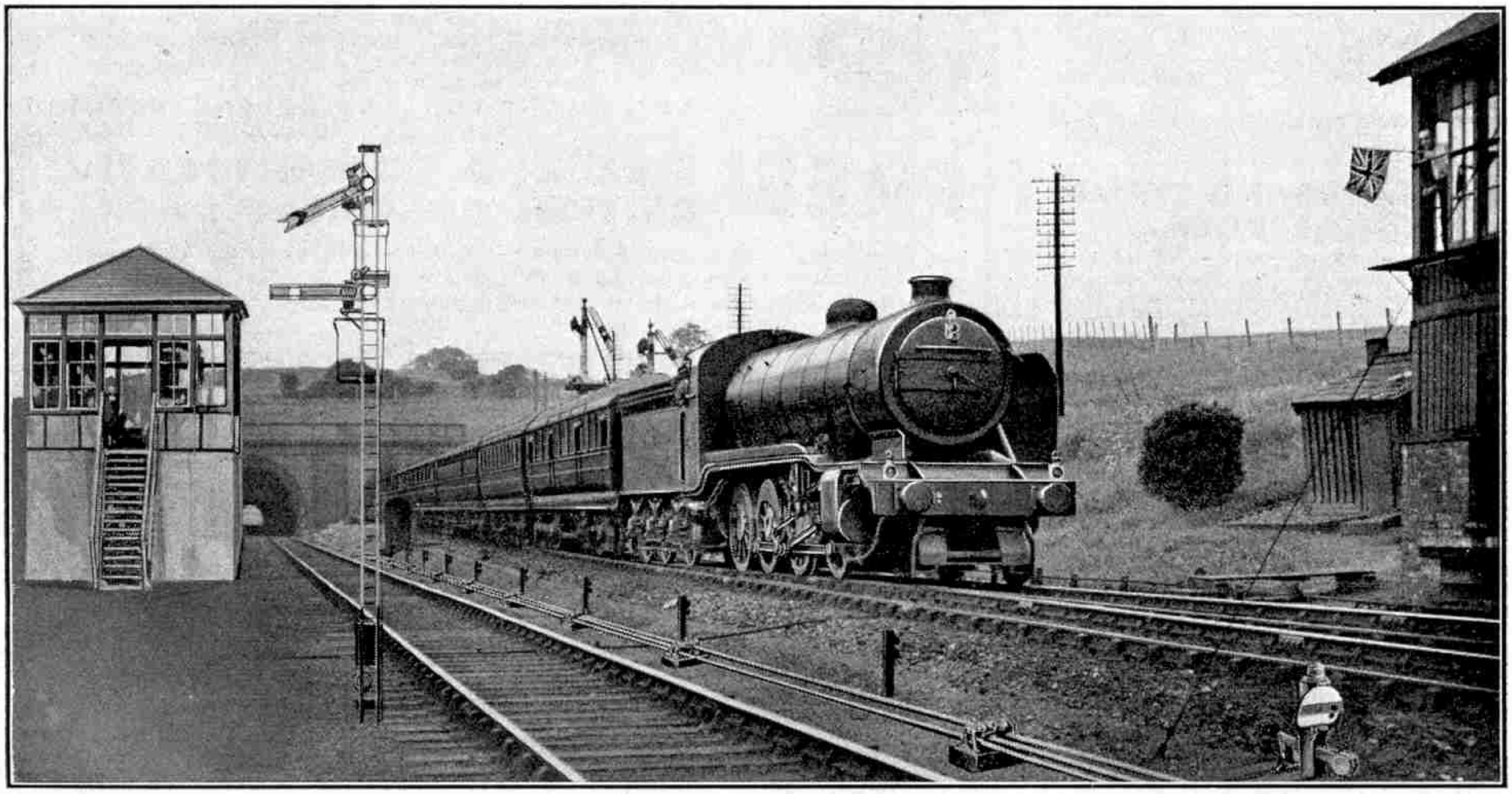
Lytham—Mr. K. Beardsall, 5, Cambridge Road, Ansdell, Lytham.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

H.R.C. COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

"SPOT THE ERRORS No. 2"



This month we announce the second of the series of "Errors" Competitions, the first of which appeared last month. In these contests competitors are required to spot mistakes purposely introduced into an illustration. The picture reproduced above is a good example; it appears to show an express passenger train travelling along the main line, but on looking at it closely it will be seen that there is something wrong. Indeed many things are wrong, and it is these that have to be hunted down.

Some of the mistakes will be apparent at a glance, but others will not prove quite so easy to discover, and members will find the search interesting and instructive. When the entrant is satisfied that he has discovered all the mistakes he should make a neat list of them, stating at the same time how each should be corrected. This should then be forwarded to Headquarters at Meccano Limited, Binns Road, Liverpool 13, in an envelope marked *"H.R.C. Errors Contest No. 2"* in the top left-hand corner. The contest will be divided as usual into two sections, Home and Overseas, and prizes of any goods manufactured by Meccano Ltd. to the value of 21/–, 15/– and 10/6 respectively will be awarded to the senders of the three best entries. A number of consolation prizes also will be awarded.

The closing date for Home entries is 30th September, and that for the Overseas section is 31st December.

Photographic Contest No. 6

This month we announce the last of the present series of H.R.C. Photographic Contests of railway interest.

Each entry must bear the competitor's name, age and address and H.R.C. membership number, also a description of the railway scene shown.

The contest will be divided into two Sections, Home and Overseas, and prizes consisting of any product manufactured by Meccano Ltd., or of photographic material if preferred, to the respective values of 21/–, 15/– and 10/6 will be awarded.

Envelopes should be marked *"H.R.C. Photo Contest No. 6"* and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, by 30th September. Overseas closing date, 31st December.

Solution

MAY LOCOMOTIVE CONTEST

1.	S.R.	"Lord Nelson" Class.	4–6–0
2.	L.M.S.	"Patriot" Class.	4–6–0
3.	G.W.R.	"Star" Class.	4–6–0
4.	S.R.	"Mogul" Class.	2–6–0
5.	G.W.R.	"King" Class.	4–6–0
6.	L.N.E.R.	"Scott" Class.	4–4–0

COMPETITION RESULTS

HOME

June "Layout Contest."—First: D. Sutherland Dunsmore (33072), Sutton, Surrey. Second: D. J. W. Brough (8246), Cheam, Surrey. Third: F. Mills (31), Kearsley, Nr. Bolton. Consolation Prizes: J. Morling (54740), Ipswich, Suffolk; J. C. Button (10335), Crewe, Cheshire; C. E. Wrayford (6039), Bovey Tracey, Devon; R. C. Sloman (53135), Worcester Park, Surrey; J. R. Sleightholme (17091), York; A. G. Wells (9100), East Dulwich, London S.E.22.

June "Photographic Contest No. 3."—First: T. Fletcher (6057), Perry Barr, Birmingham 20. Second: L. Hollyoak (3310), Earlsdon, Coventry. Third: B. H. Salisbury (44308), Wembley, Middlesex. Consolation Prizes: J. Habart (53869), Golders Green, London N.W.11; T. G. Cook (43441), Shirley, Croydon; F. Mills (31), Kearsley, Nr. Bolton; A. C. M. Clements (31981), Tunbridge Wells; A. Donaldson (6868), Belfast; D. H. Wakely (17486), Cheam, Surrey.

OVERSEAS

February "Articles Suggestion Contest."—First: D. Murison (37642), Buenos Aires, South America. Second: G. Yule (34970), Melbourne, Australia. Third: K. Cassells (35910), Wellington, New Zealand. Consolation Prizes: M. De Lima (34925), Bombay 7, India; A. A. Shawky (53749), Orman, Egypt.

February "Locomotive Faces Contest."—First: A. A. Shawky (53749), Orman, Egypt. Second: R. Pearson (29199), Victoria, Australia. Third: D. Murison (37642), Buenos Aires, South America.

March "Layout Contest."—First: A. G. Fellows (29952), Auckland, N.4, New Zealand. Second: C. C. Henriques (58659), Jamaica, B.W.I. Third: I. H. Wells (44581), Kimberley, South Africa. Consolation Prize: K. Cassells (39510), Wellington, New Zealand.

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3 ,, ,, Cor.	10d.	1 ,, Jub. ...	3d.
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STAMP COLLECTING

Is Stamp Collecting a Paying Hobby?

AT this season of the year, when the new stamp catalogues have just made their appearance, we hear quite a lot from fellow stamp collectors about this, that, and the other stamp that has gone up in value. Some stamps of course do increase in value and, although the primary reason for collecting stamps must be the pleasure to be derived from the pursuit, it is worth while to devote a little space to the money side of the hobby.

The average schoolboy collector gains his experience necessarily with common stamps given to him by friends and relatives from business mail. The majority of such stamps are exceedingly common and unlikely ever to increase greatly in value. The experience gained with such stamps will be invaluable eventually, however, when the collector finds that the only way of building up his collection quickly is by purchasing stamps from dealers. Boys of limited purchasing power obviously cannot compete with wealthy collectors who buy rare stamps of early issues, but they can keep their eyes open for specimens of modern issues that are likely to become rare. Modern stamps will take longer to rise in value, but the rise is none the less certain. Also they can look for and frequently find early stamps from countries that are now "out of fashion," but are likely to be in the news again soon.

The fact that modern stamps are issued in large quantities is the key to the situation. Large supplies mean low prices and small supplies bring high prices. Only when the big quantities have been absorbed by the demands of collectors can selling prices rise. The quicker the supplies are absorbed the sooner do prices rise—and the smaller the original supply, the higher will the prices climb.

There are plenty of modern issues that provide scope for price increase, and as time goes on there will be others. The collector who seeks to secure a profit on his stamps must be ever alert for his opportunities. He will find them mainly among stamps that have a legitimate postal purpose, that are on issue for only a limited period and are produced in quantities not greater than would normally be sufficient to achieve the purpose. Probably the best example of a modern issue that complied with those requirements was the British Colonial King George V Silver Jubilee series of 1935. A complete set of such stamps is catalogued to-day at five to six times its price at the time of issue, and it is certain to rise still higher.

An attractive design alone will not achieve a rise in value. For instance, few popular commemorative and charity issues will ever command really good prices; their very popularity secures for them a wide distribution.

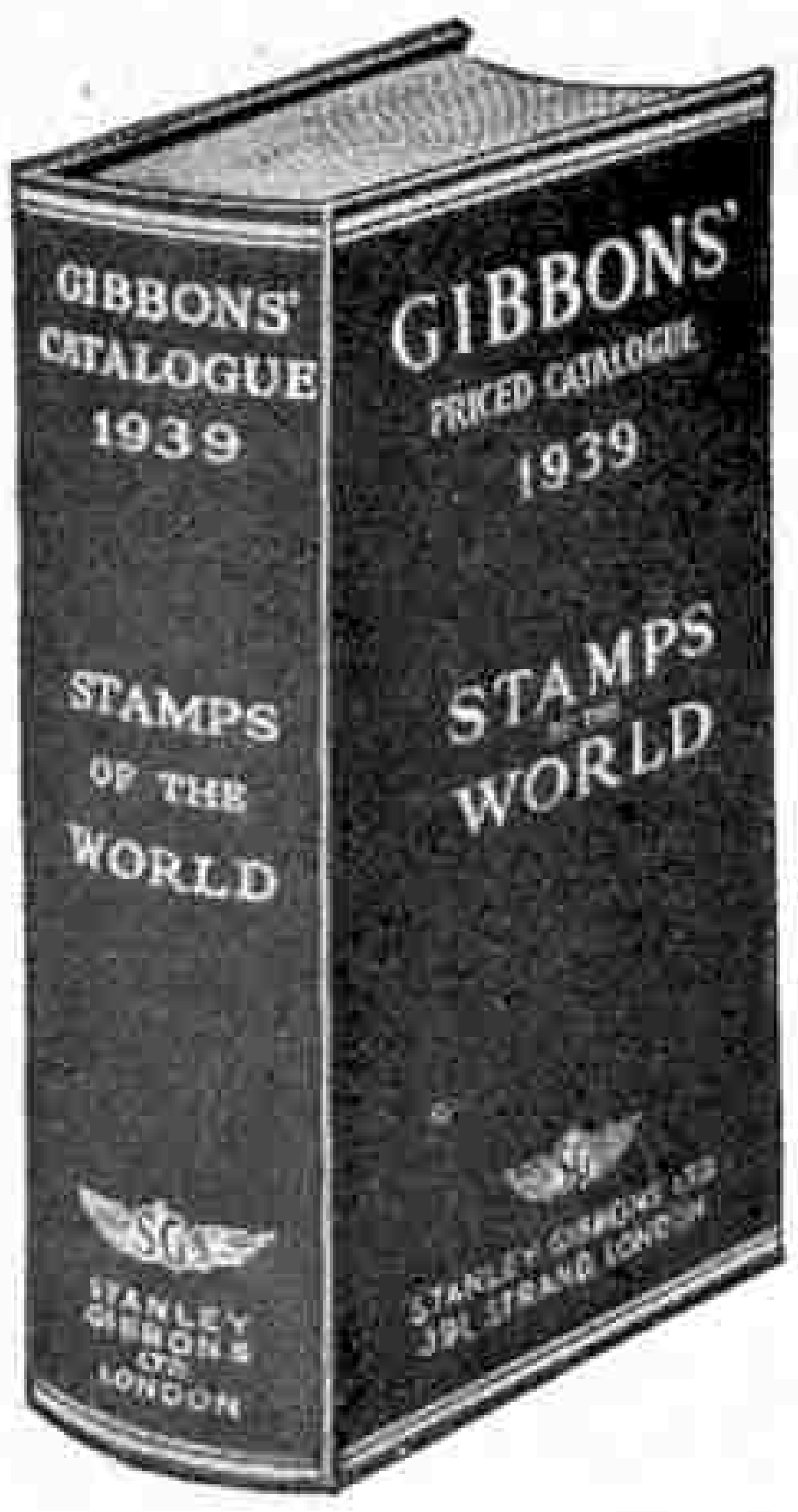
It is a good maxim to buy the highest values one can afford when buying for investment. Naturally, fewer high than low values are issued and it is better therefore to buy the 1/– value of a set than twelve of the 1d. values. The 1d. values will fill plenty of space, but it may remain for the collector's great-grandson to reap the benefit of any rise in values. This point is illustrated by the fact that in 1901 it was possible to buy the six lowest values ½d. to 6d. of the first issue from British New Guinea, now known as Papua, for 2/–, and the 1/– value cost another 2/–. At the same time the 2/6 value could be secured for 4/–. To-day the catalogue value of the set up to the 1/– value is just a little over £5, and the 2/6 stamp alone is worth £10.

It is unlikely that many modern issues will appreciate to quite the same extent in such a short time, but the collector who studies his hobby carefully will often have an opportunity of picking up similar bargains. Speaking of bargains, however, young collectors would do well to avoid bargain packets of valuable stamps offered at ridiculous discounts from catalogue prices, unless they are offered by reputable dealers. Stamp dealers are keen business men and are willing to help their customers as much as they can, but they do not give their stocks away deliberately. A good stamp will always command its value, and "valuable" stamps offered cheaply rarely bear careful inspection. Reputable stamp dealers do occasionally make such offers when they are seeking to attract business for something else, and they will always be willing to give a guarantee of the genuineness of their stamps.

Occasionally, we receive a little grumble from readers to the effect that when they have tried to dispose of a stamp collection, dealers have not offered prices equal to those paid for the stamps a short time before. A little reflection, however, will help other readers who have encountered the same problem to realise that it is only rarely that equal or better prices can be expected, unless values have risen between the buying of the stamps and the sale. Stamp dealers must make a profit if they are to remain in business, and that profit is represented by the difference between their buying and selling prices.

THE STATES RATIFY THE CONSTITUTION 1788
UNITED STATES POSTAGE 1938
3
THREE CENTS
3

It will be seen that our view is that stamp collecting as a hobby should be approached first as a means of enjoyment, and that those who pursue it from that angle are likely to benefit most from the undoubted possibilities of increase in value.



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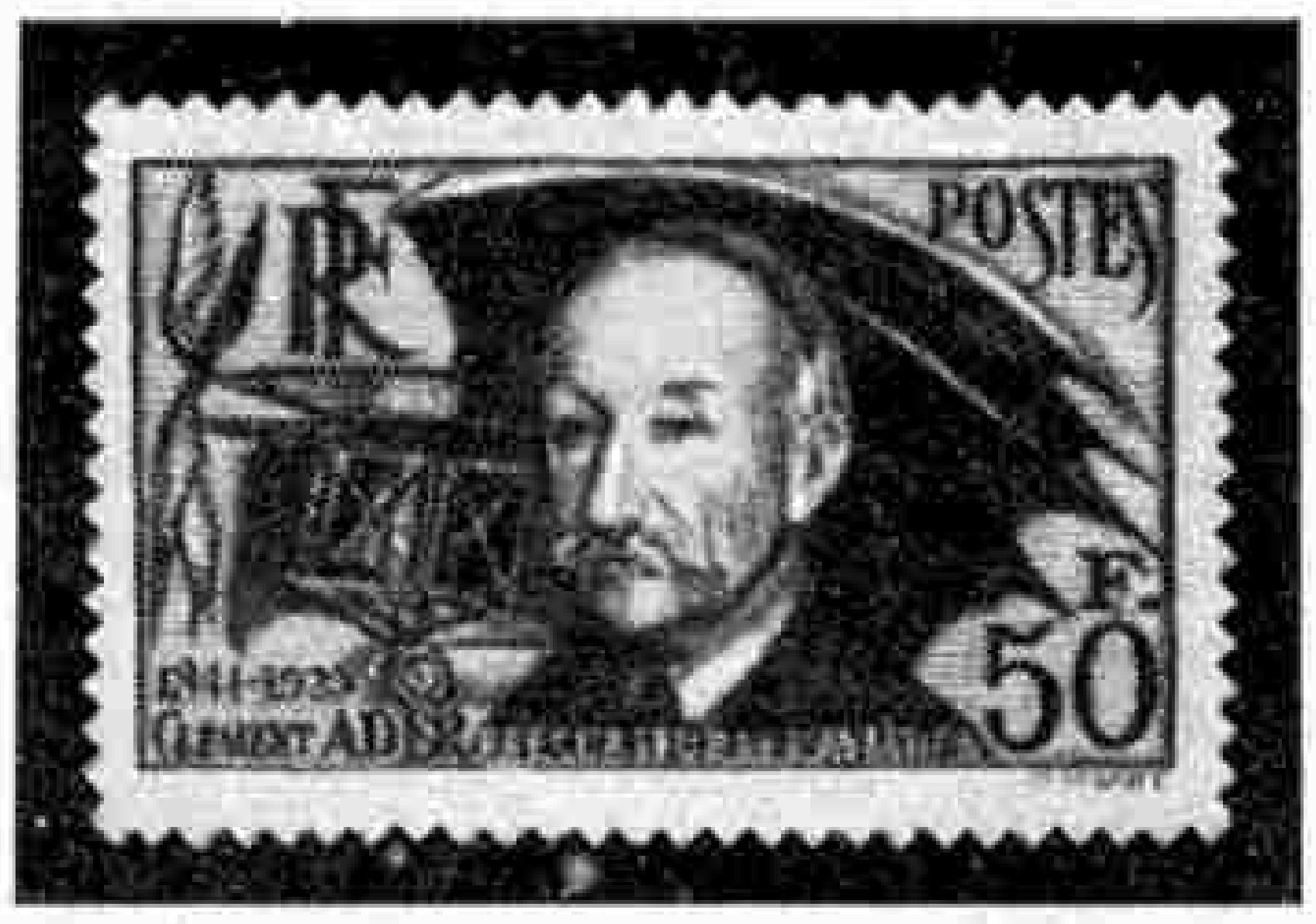
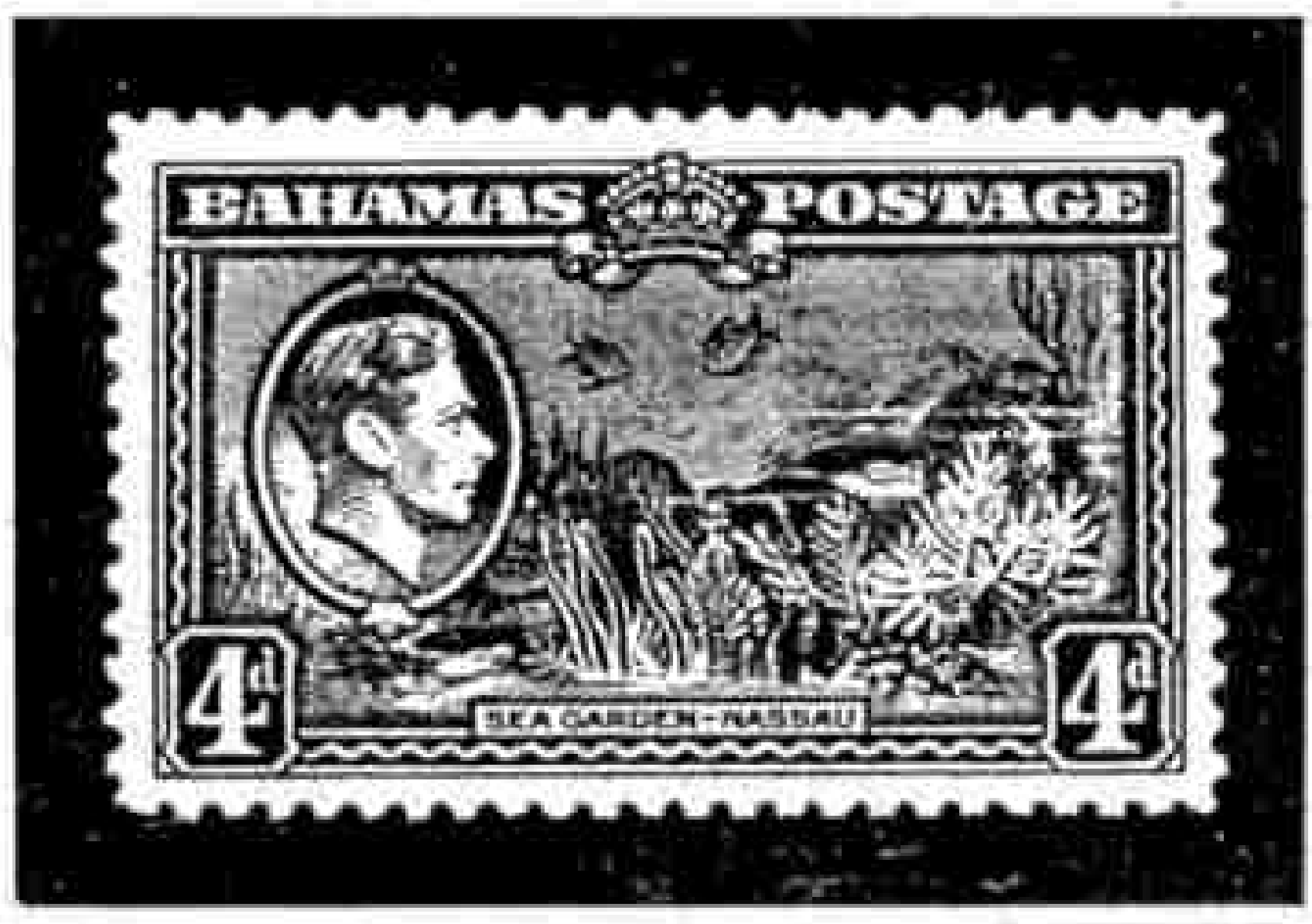


Stamp Gossip

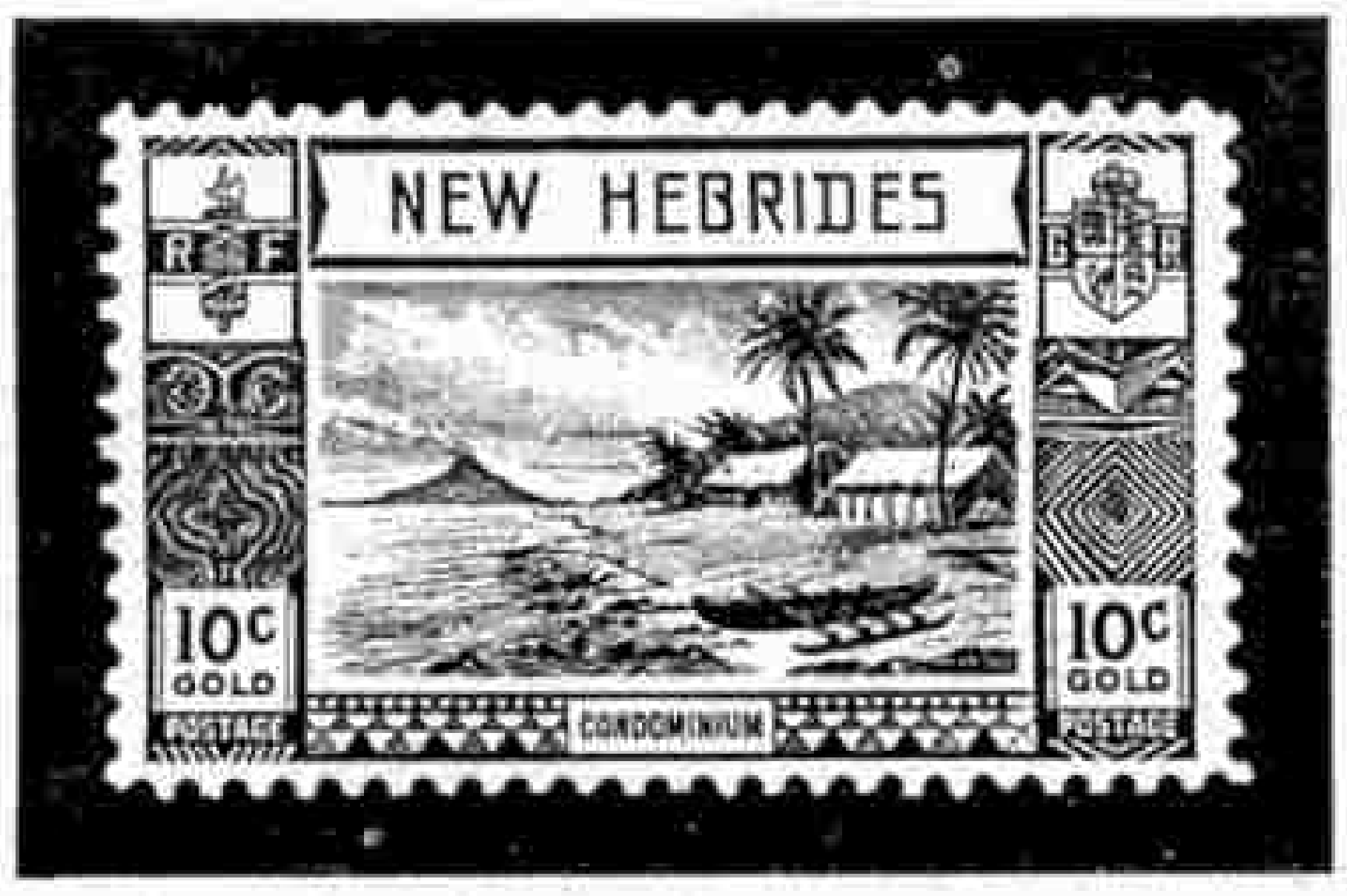
and Notes on New Issues



New British Colonials

Among the new Colonial designs that have appeared in recent weeks the outstanding series are those for the Bahamas and the Turks and Caicos Islands.

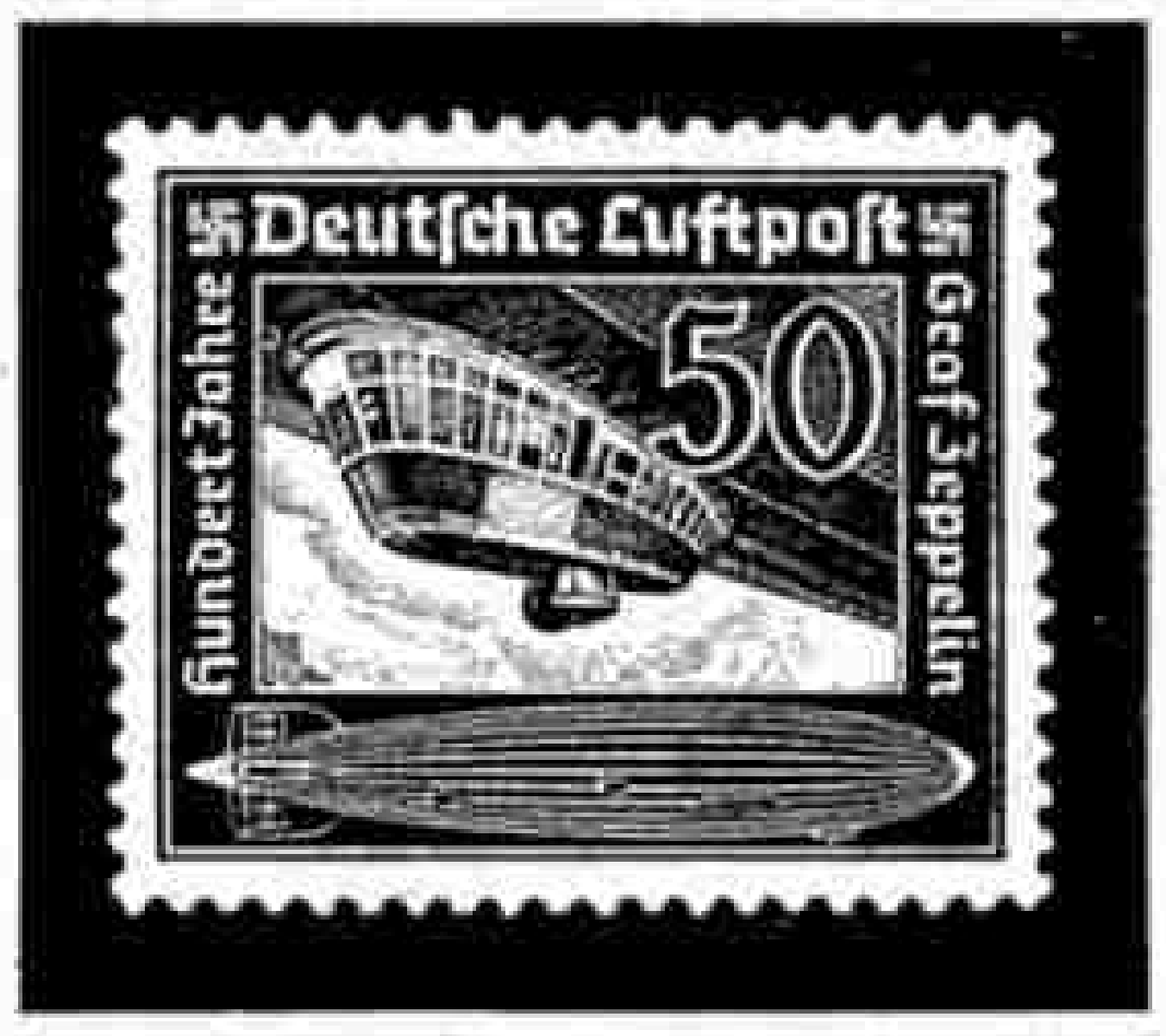
The Bahamas series are additional values to those already issued and have designs as follows: 4d., under-sea garden at Nassau (illustrated); 6d., view of Fort Charlotte (illustrated); 8d., flamingoes in flight. This last design is identical with the 8d. value issued in June 1935, except for the substitution of the portrait of King George VI.



The Turks and Caicos Islands issue provides two views of operations in the local salt industry. One design, illustrated on page 533, is used for the nine values from ½d. to 1/–, and a similar picture in upright format is used for the three high values 2/–, 5/– and 10/–.

The New Hebrides design, illustrated on this page, shows a volcanic landscape, but from the stamp point of view is more interesting for its first reference to the island's new currency, in which 100 gold centimes equal one gold franc. The appearance of the word gold in the value tablet is a feature unique in stamp collecting.

The New Hebrides Islands are jointly administered by Britain and France, which explains the presence of the word "condominium" at the foot of the stamp, the design of which bears the arms of France and Britain in the left and right uppermost corners respectively. Below are panels representative of native art. Our illustration is of the 10 centimes value issued by the British post offices. The French post offices simultaneously issued a stamp, identical in its main features, but with the borders changed so that the British arms and the supporting art work appear on the left of the stamp and the French on the right, and with the name of the country in French.



Both British and French issues comprise a full range of 12 values from 5c. to 10f., each using the design illustrated, but the value tablets read "Centimes Or" or "Francs Or" according to the denominations, in the French issues.

We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

More French Commemoratives

The flow of new French issues is remarkably heavy at the present time and although one cannot help thinking that there is a tendency to overdo things, most of the new stamps certainly have an interest that saves them from absolute lack of distinction.

The most interesting of this month's issues is a 55c. value to commemorate Jean de La Fontaine, the great 17th century writer of stories and fables.

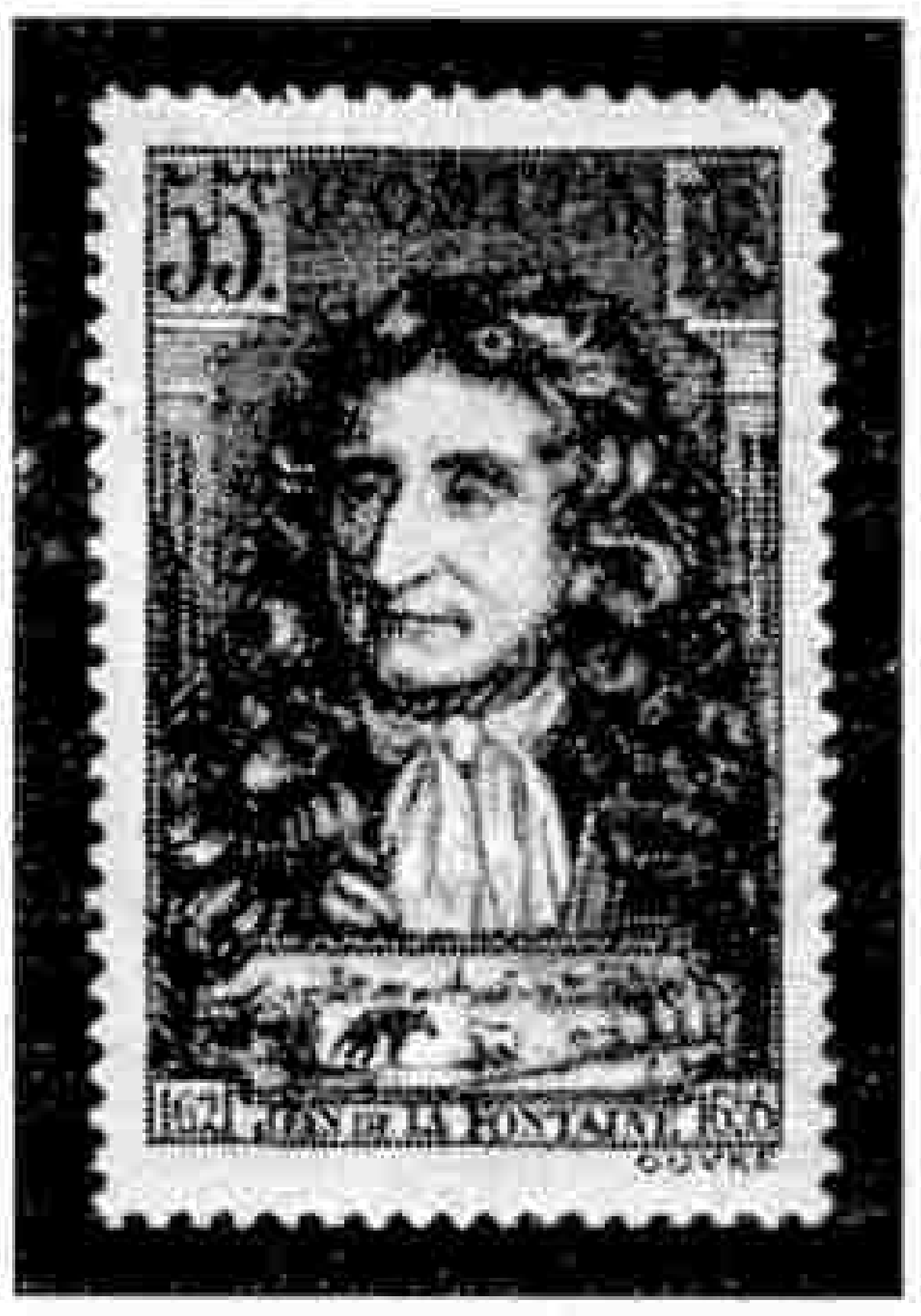
The stamp illustrated here shows a portrait of La Fontaine and, at the foot, a scene based upon what is probably the best known of his fables. The story is that of the lamb and the wolf that sought to justify itself to the lamb before it killed it. The wolf and the lamb were drinking from the same stream when the wolf turned upon the lamb and threatened its life for fouling its drinking water. When the lamb pointed out that it was downstream from the wolf and could not be responsible for the fouling, the wolf retorted "Then it was a relative of yours." The lamb, however, had no relatives. Then it was someone like the lamb, and when finally the lamb pointed out that there was no animal like it anywhere near, the wolf gave its final answer that whether it was the lamb or his kind or not he was going to kill him because he liked to kill lambs.

La Fontaine was born in the duchy of Chateau Thierry in 1621 and it was not until comparatively late in life that he turned to literature. He died in 1695.

Another outstandingly interesting item is a 50f. high value commemorating Clement Ader (1841–1925), an electrical engineer who, in 1872, produced an ornithopter, an air machine that was intended to fly by a bird-like flapping of its wings. This machine was the first of a series produced by Ader, and that shown on the stamp, illustrated in the heading on this page, is his third production, now in the French Museum of Arts and Crafts. This was built in 1891 and is said to have flown, although the evidence to this effect is usually discredited.

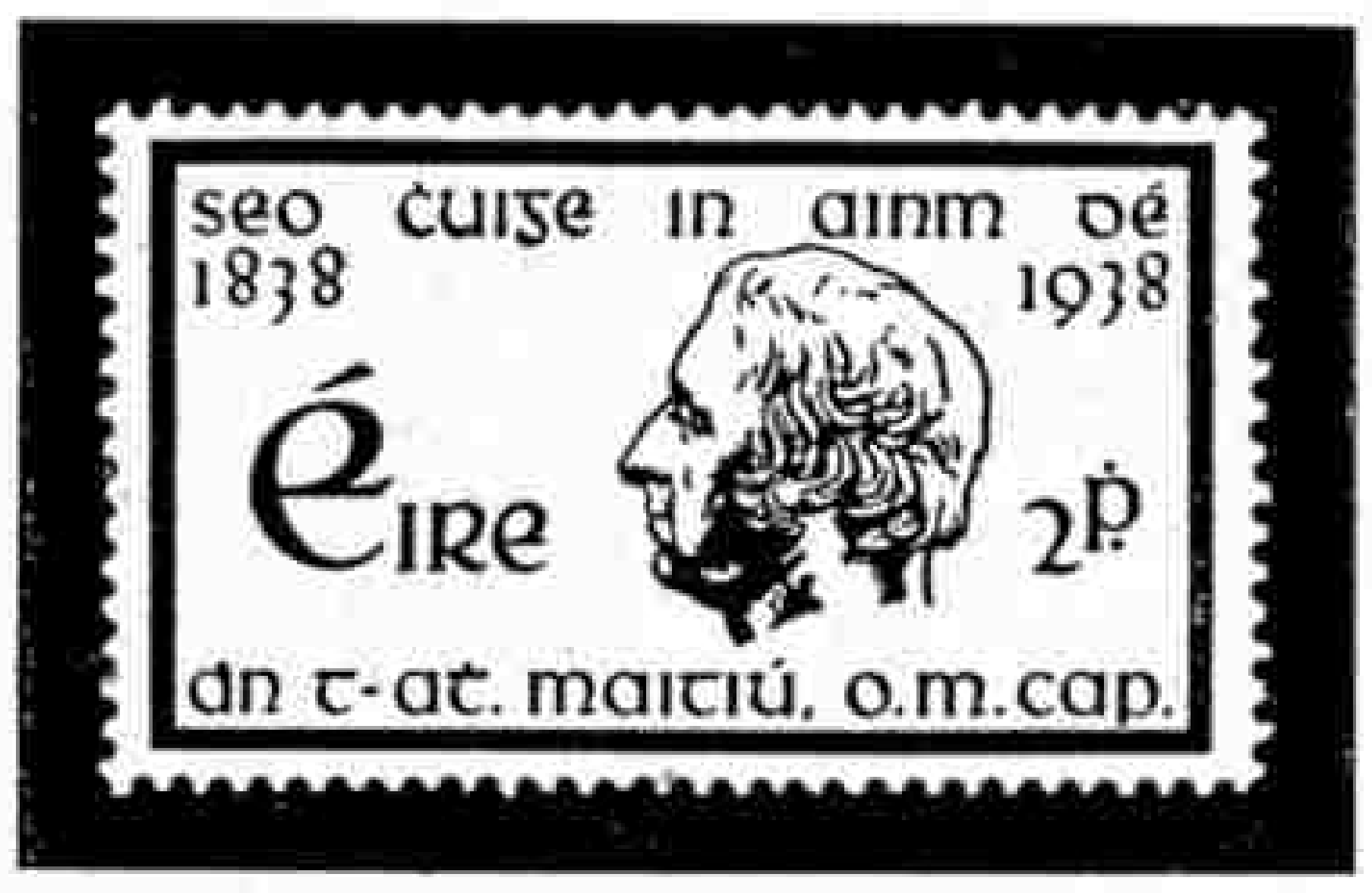
A 1f. 75 stamp also has been issued to commemorate this year's World Football Championships, held at the Colombes Stadium in Paris on 19th June, when Italy beat Hungary in the final. Neither the English nor Scottish Football Association recognise this tournament or take part in it.

We are able to illustrate on page 533 the stamp commemorating the visit of Their Majesties King George VI and Queen Elizabeth to Paris on 19th July, to which we referred last month. Readers will remember that the visit was originally fixed for 28th June, the date shown on the stamp. The death of the Queen's mother caused a postponement, but there was not time between the original and amended dates to revise the stamp design.



Father Mathew Centenary

We are indebted to Mr. Charles F. Bourke of Waterford for a souvenir cover bearing the stamp issued in Eire to commemorate the centenary of the great temperance campaign conducted by Father Theobald Mathew. Father Mathew was born in 1790 and after entering the Capucin Order of Monks, he worked among the poor in Cork. He became convinced that over-indulgence in drink was the cause of much of the poverty he saw, and drew up a temperance pledge as a basis for a great national campaign. His words as he himself signed this pledge, "Seo cuige in ainm De" (Here goes, in God's name!), appear on the stamp. The design of this stamp illustrated here, will evoke criticism, we imagine, but we confess that we like it. The subject and the stamp are at one in an uncompromising almost stark simplicity.



An Attractive New German Stamp

German commemorative issues usually have attractive designs, and the recent 25 pf. and 50 pf. stamps commemorating the centenary of the birth of Count Zeppelin are no exception, as our illustration of the 50 pf. stamp on this page shows. It gives a striking view of an airship gondola, and below is a simple sketch of one of the famous Zeppelin aircraft.

The series consisted of two stamps and the design of the 25 pf. value, not illustrated here, shows Count Zeppelin in one of his early airships.

* * * *

We illustrate on page 533 the two American stamps to which we referred in our August "Stamp Gossip" notes, commemorating respectively the 150th anniversary of the Ratification of the Constitution and the tercentenary of the landing of the Swedish and Finnish settlers at the Delaware River on 8th April, 1637.

East Anglian Expresses

By D. C. Crick

It is impossible to run trains at very high speeds on the Great Eastern Section of the L.N.E.R., and this is partly due to the nature of the line, for 4–6–0 engines are the largest that can be used on this section. Very fine work is done, however, and the trains have been slightly speeded up during the last few years.

There has been a very great improvement in rolling stock since the grouping in 1923. The new corridor coaches are similar to those used on trains such as the more important East Coast main line services. The fastest and heaviest trains are usually hauled by the "Sandringham" 4–6–0 three-cylinder class. On the less important expresses the "Claud Hamilton" 4–4–0 and the "8500" 4–6–0 classes are used.

During the summer months the *"Eastern Belle"* Pullman train, usually hauled by a "Sandringham" engine, runs day excursions to various seaside resorts, and provides an outing at a much lower cost than is otherwise available, and with much greater luxury. Five-day season tickets are available from Mondays to Fridays. Luncheon and supper are served without it being necessary for passengers to leave their seats.

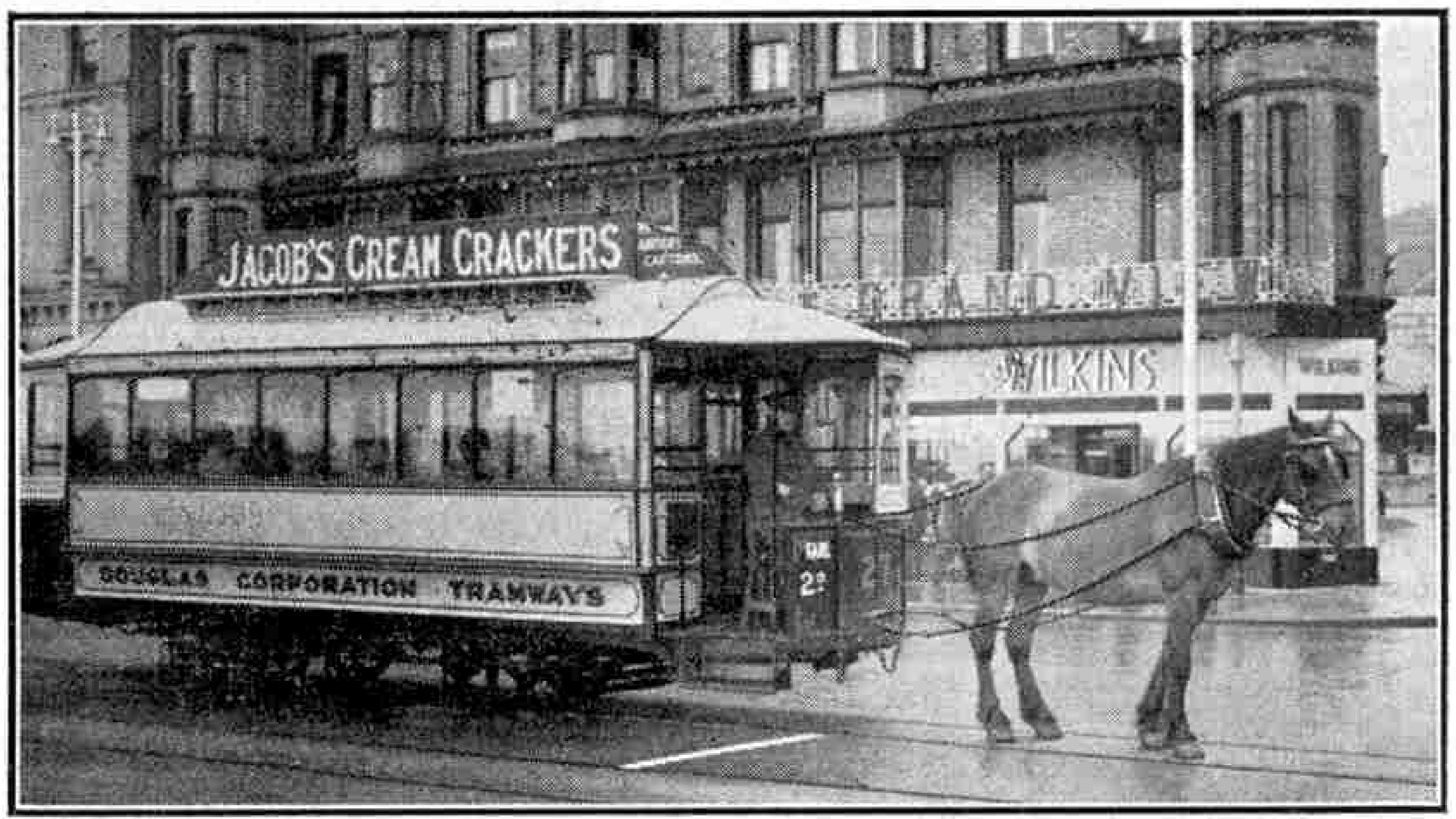
Every evening at 8.30 the *"Hook and Antwerp Continental"* leaves Liverpool Street for Parkeston Quay. The distance from Liverpool Street to Parkeston Quay is 69 miles, but 87 minutes is allowed on the down journey and 98 minutes on the return. The *"Hook and Antwerp Continental"* returns at 7 o'clock the following morning. Another train is run one hour later every day except Mondays.

In 1936, a new train was built for this service with similar internal fittings and decorations to those of *"The Silver Jubilee,"* but there are special Restaurant and Pullman cars. As is the practice on the Continent of Europe, this train and indeed all the L.N.E.R. Continental trains, are provided with second class accommodation. The *"Flushing Continental"* and the *"Scandinavian"* follow the same route, leaving London at 9.30 a.m. and 3.10 p.m., returning at 6.45 and 5.30 p.m. respectively.

There are two routes from Liverpool Street to Norwich, one via Cambridge and the other via Colchester and Ipswich. Before the War, in the days of the Great Eastern, there were some very fast timings to Norwich. The trains then were hauled by the 4–6–0s of the G.E.R. "1500" class, now the L.N.E.R. "8500" class.

Last year two engines of the "Sandringham" class were specially streamlined for service on the *"East Anglian,"* which follows the Colchester route.

The "Mauretania" in the fitting-out basin after her launch at the yard of Cammell Laird and Co. Ltd., Birkenhead. An article on the vessel appears on page 495. Photograph by T. C. L. Hutchinson.



A horse tram on the Promenade at Douglas, Isle of Man. These are the last of their type in the British Isles, and will cease running this year. Photograph by A. R. Prince, Manchester.

A Proposed New Calendar

Our calendar has served for nearly 200 years since its main details were settled, although it has been necessary from time to time to make adjustments. For instance, in the year 1752 the eleven days between 2nd and 14th September were omitted to allow for accumulated errors due to the fact that the year is about 11 minutes less than the 365¼ days previously allotted to it. This proceeding aroused a storm, for many people seemed to think that they were being robbed of eleven days of their lives.

Efforts have occasionally been made to alter the calendar, the most drastic being that of the French Revolutionists in 1793, who marked in this way the era that began with the proclamation of the Republic on 22nd September 1792. Their calendar was used only in French territory, and even there did not last many years.

An interesting suggestion has now been put forward that will give months of more uniform lengths than at present. The idea is to rearrange the months into four groups of three each, beginning with January, April, July and October respectively, and to give 31 days to the first month in each group and 30 to each of the others. This would leave one day over, and it is suggested that this should be a holiday. The extra day for Leap Year would be placed in the middle of the year.

A New Skybird Model

A. J. Holladay and Co. Ltd., the well-known makers of solid scale model aeroplanes, have introduced a satisfactory outdoor model with the ability to stand up to the gusty winds that so often prevail in this country. This is the Skybird "Sturdy" No. 1 Flying Model, and it is available in the form of a constructional set in which all parts are sawn to the correct section, the ribs are shaped and drawings are supplied to enable the owner to complete the model, which is pleasing in appearance and as sound as its name implies.

Interesting recent additions to the Skybird range of accessories include Anti - aircraft Defence models, with the latest type of searchlight and equipment, sound locator and anti-aircraft guns and crews.

Owners of Skybird models are reminded that the annual photographic competition closes on 1st October. This contest is open to members of the Skybird League, and entries must be photographs of Skybird models, of which at least one must have been assembled and painted by the competitor. Full details can be obtained on writing to A. J. Holladay and Co. Ltd., 3, Aldermanbury Avenue, London E.C.2.

A Model Helicopter

Ever since flying began inventors have tried to design successful helicopters, or aircraft heavier than air that can rise vertically into the air instead of having to make a preliminary run along the ground. A model that actually will do this is the Skylark Vertical Flier, advertised in our pages this month. It is fitted with twin propellers, and makes a really startling vertical flight to a height of 150 ft. in 7 second.

The model can be assembled and dismantled in less than five minutes, and is very simple to manage. Full details of it will be sent to any reader who writes to Lucas's, 17, Houghton Street, Clayton Square, Liverpool 1, and mentions the "*M.M.*"

Hobbies 1939 Handbook

The 1939 edition of the well-known catalogue issued annually by Hobbies Ltd. is fully up to the standard of its predecessors, and is indispensable to all handymen. It is concerned chiefly with fretwork, giving details of fretwork apparatus and equipment from the simplest type for beginners to the elaborate motor-driven machinery used by large scale workers.

A design chart for a Big Ben clock model 3 ft. in height is given free with the Handbook, and a large design sheet for building a splendid model paddle steamer also is available for purchasers. In addition there are illustrated designs for models of all kinds, including doll's houses, an old time locomotive, steamships, trays, boxes, calenders, cabinets and clock cases. Details also are given of an extensive range of woodworking and carving tools, and there are other splendid articles on various forms of craft work.

The Handbook can be obtained for 6d. from any newsagent or Hobbies dealer, or direct from Hobbies Ltd., Dereham, Norfolk, for 9d. post free.

The Model Engineering Exhibition

The twentieth annual Model Engineering Exhibition will be held at the Royal Horticultural Hall, Vincent Square, Westminster, from 15th September to 24th September. It will be opened on the first of these dates by the Earl of Northesk, President of the Society of Model and Experimental Engineers, and there will be a record display of engineering and ship models of all kinds, together with lathes, light machine tools and workshop equipment for the model engineer. A special attraction will be an exhibit arranged by the Royal Air Force to illustrate the methods used in the training of aircraft apprentices. Championship Cups and other prizes are being offered for the finest models displayed, and this year a special cup is being presented by Admiral Sir Reginald Bacon for the best model made by a lady.

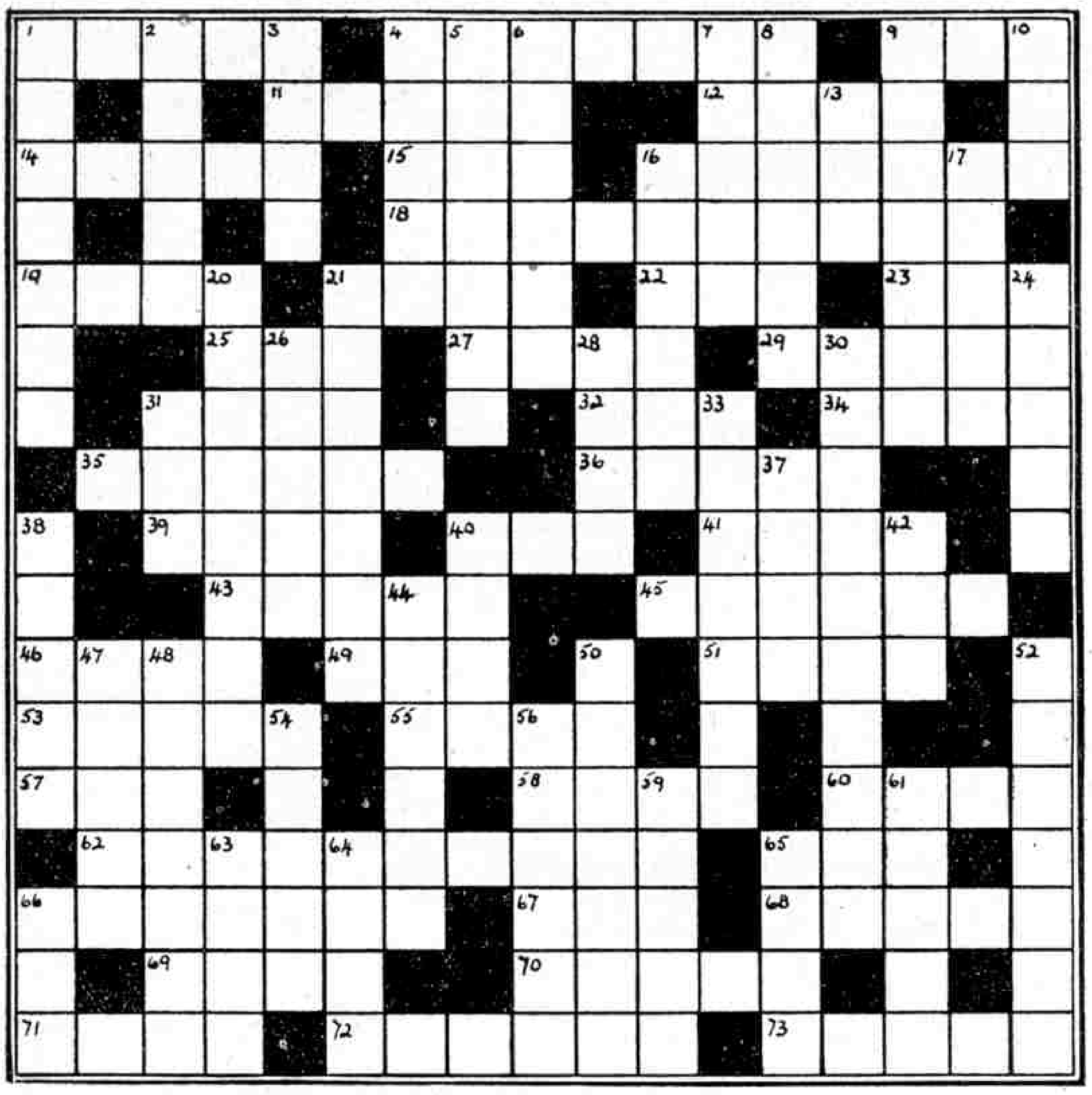
Full details of the Exhibition can be obtained on writing to the organisers, Percival Marshall and Co. Ltd., 13–16, Fisher Street, London W.C.1.

Competition Corner

SEPTEMBER CROSSWORD PUZZLE

CLUES ACROSS

1. Summit
4. Electrical fitting
9. Weeding implement
11. Eye socket
12. Human organ
14. Enlist
15. Ready
16. Naval officer
18. Varies
19. Sea bird
21. Famous school
22. Number
23. A small gift
25. To be in trouble
27. Lake
29. Slip
31. Unadulterated
32. Viper
34. Sugar-coated
35. Type of shrub
36. Set in motion
39. Religious ceremony
40. Edge
41. Bar
43. Patchwork poem
45. Weapon
46. Ancient Peruvian monarch
49. Bruised oak bark
51. Overcome
53. Taxes
55. Bring up
57. Hasten
58. Thrust
60. Preposition
62. Science of preserving public health
65. Bird's call
66. Abuser
67. Girl's name
68. Positive pole in electrolysis
69. Measures of length
70. Roman goddess
71. Trim
72. Rising high
73. Protruding teeth



CLUES DOWN

1. Speedy animal
2. Mistake
3. Narrated
4. Behind
5. Document of honour
6. Tone up
7. Invest
8. Invaded Britain
9. Holds unauthorised beliefs
10. Finless fish
13. Hold a session
16. Testify
17. On one side
20. Marine
21. First principle
24. Foot lever
26. Enraged
28. Coarse file
30. Legal contest
31. By way of
33. Allegory
37. Fury
38. Trust
40. Solitary
42. Permit
44. Irritable person
47. Clamour
48. Chopper
50. Jazz singer
52. Middlemen
54. Motionless
56. Each
59. Knots on a tree
61. Secluded corners
63. Famous river
64. Trial
65. Throw
66. Tear

The *"M.M."* crossword puzzles in the past have been exceptionally popular, principally, no doubt, because they are set for amusement rather than strenuous competitive effort. This month's puzzle will be found to follow the lines of those set in previous issues in that it is fair and interesting. The clues are all perfectly straightforward, and every word used can be found in Chambers' or any other standard dictionary.

Prizes of Meccano products value 21/–, 15/–, 10/6 and 5/– respectively will be awarded in order of merit to the senders of the four correct solutions that are neatest or most novel in presentation. The prizes will be duplicated for the Overseas section, which is open to all readers living outside Great Britain, Ireland and the Channel Islands.

Entries should be addressed *"September Crossword Puzzle,* Meccano Magazine, Binns Road, Liverpool 13," and must be sent to reach this office not later than 30th September. A separate set of prizes will be reserved for Overseas readers whose entries must arrive not later than 31st December.

September Photo Contest

This month's contest is the last of the 1938 Summer Photographic Contests and we should like to take the opportunity of urging every one of our photographic readers to submit at least one entry. Details of a new series of winter contests will be announced in our next issue.

There are no restrictions as to subject, size of the photograph, make of camera, film or paper, but each print must have a title, and the exposure must have been made by the competitor.

Entries for this competition will be divided into two sections, A, for readers aged 16 and over, and B, for those under 16; and prizes of Meccano products or photographic materials, as chosen by the winners, to the value of 21/– and 10/6 will be awarded in each section.

Entries sent this month must be addressed *"September Photo Contest,* Meccano Magazine, Binns Road, Liverpool 13," and must arrive on or before 30th Sepember. Overseas closing date 31st December.

Competition Closing Dates

HOME

September Crossword Puzzle	**30th September**
September Photo Contest ...	**30th September**

OVERSEAS

June Crossword Puzzle ...	**30th September**
June Photo Contest	**30th September**
"Hidden Proverbs" Contest ...	**31st October**
July Photo Contest	**31st October**
August "Silhouettes" Contest	**30th November**
August Photo Contest... ...	**30th November**
September Crossword Puzzle ...	**31st December**
September Photo Contest ...	**31st December**

Watch the Closing Dates:

Competitors, both Home and Overseas, are particularly requested to make a careful note of the closing dates of the competitions.

In sending entries to competitions that are divided into age groups, competitors should take particular care to mark their ages clearly on the back of the entry. It is not sufficient merely to indicate the age group, as age allowances are given to ensure equality of opportunity for the younger competitors.

COMPETITION RESULTS

HOME

July Photo Contest.—First Prizes: Section A, F. Culverhouse (Sheffield 7); Section B, S. Cook (Sheepy). Second Prizes: Section A, A. B. Bishop (Bristol 4); Section B, V. Lane (Honeth). Consolation Prizes: L. Hollyoak (Coventry); F. C. Kelly (Aberdeen); J. E. Martin (Fishguard); W. R. H. Temple (Upminster); J. V. Thurston (Radlett).

"Hidden Proverbs" Contest.—1. R. W. Munro (Motherwell). 2. D. Glen (Barking). 3. M. K. Tucker (Reigate). 4. C. Wrayford (Bovey Tracey). Consolation Prizes: F. T. Evans (Pensby); D. L. Martin (King's Lynn); J. G. Turnbull (Ilford).

OVERSEAS

April Photo Contest.—First Prizes: Section A, G. Papa (Naples); Section B, J. A. Early (Vaucluse, N.S.W.). Second Prizes: Section A, E. B. Cox (Hawera, N.Z.); Section B, J. Geertsma (Leiden, Holland). Consolation Prizes: C. W. Beese (Hamilton, Ont.); J. G. Clifton (Rockdale, N.S.W.); J. Jasper (Manly, Australia); T. Watson (West Leichhardt, N.S.W.).

Golfwords Contest.—1. G. D. McKee (New Plymouth, N.Z.). 2. R. W. Roddick (Rosario de Sta. Fe, Argentine). 3. P. Cuthbert (Capetown). 4. E. A. Bunt (Capetown). Consolation Prizes: J. Lyons (Penang, S.S.); D. Perrin (Greymouth, N.Z.); S. P. Scott (East London, S.A.); E. Worthington (Vancouver, B.C.).

TOO NOISY

Foreman: "Why are you leaving?"
Riveter: "I don't mind hammering rivets all day long, but the next man to me hums incessantly."

* * * *

"Yes," said the explorer. "I slept for more than twenty-four hours on end!"
"On end?" asked Brown.
"Yes, on end."
"Why didn't you try lying down!"

* * * *

"My daughter is playing Beethoven this evening."
"Does she hope to win?"

* * * *

"Seen any mysterious strangers around here lately?" casually inquired the detective from the city.
"Waal," replied the old man, "there was a feller over 'ere last week with the circus what took a pair of rab'its out o' my whiskers."

* * *

Customer (to waiter with black eye): "Why don't you apply a piece of steak to it?"
Waiter: "It was a lump o' steak the gentleman threw at me."

* * *

Customer: "I want something funny and quaint as a mascot for my car."
Boy (minding shop): "Boss, you are wanted."

* * * *

Jim: "I say, Jack, did you know that there was a leek in the Mersey Tunnel last month?"
Jack: "My goodness, how on earth did that happen?"
Jim: "It fell off the back of a lorry."

* * * *

Sergeant: "If anything moves, you shoot."
Sentry: "Yessir. And if anything shoots, I move."

* * * *

Tommy was very puzzled. "Daddy says that this is a camel hair brush," he said, looking at a paint brush.
"And so it is, dear," said Mother.
"But what a terrible time it must take him to brush himself."

* * * *

Dad: "There are many things in this world to which we must shut our eyes."
Tommy: "Yes, Dad, and soap is one of them."

* * * *

Uncle: "Jimmy, I'm going to give you a bright new penny."
Jimmy: "I'd rather have a dirty old sixpence."

* * * *

When Freddie handed in his homework the teacher examined it closely.
"That looks suspiciously like your father's handwriting, Freddie," he said. "What have you got to say?"
"Well, sir," replied Freddie, "I used his fountain pen."

* * * *

Bob: "Why is a dog's tail like the centre of a tree?"
Bill: "I don't know."
Bob: "Because it's farthest from the bark."

* * * *

Timid Visitor: "Has anybody ever been lost in crossing the river?"
Ferryman: "No, sir. My brother was drowned here last week, and a man from the next village fell out of a boat when crossing about two months ago, but we found 'em both about a mile down the river before a week had passed."

* * * *

Captain: "Look here, if we win this match, you're on a fiver!"
Referee: "Oh; and what am I on if you lose?"
Captain: "A stretcher!"

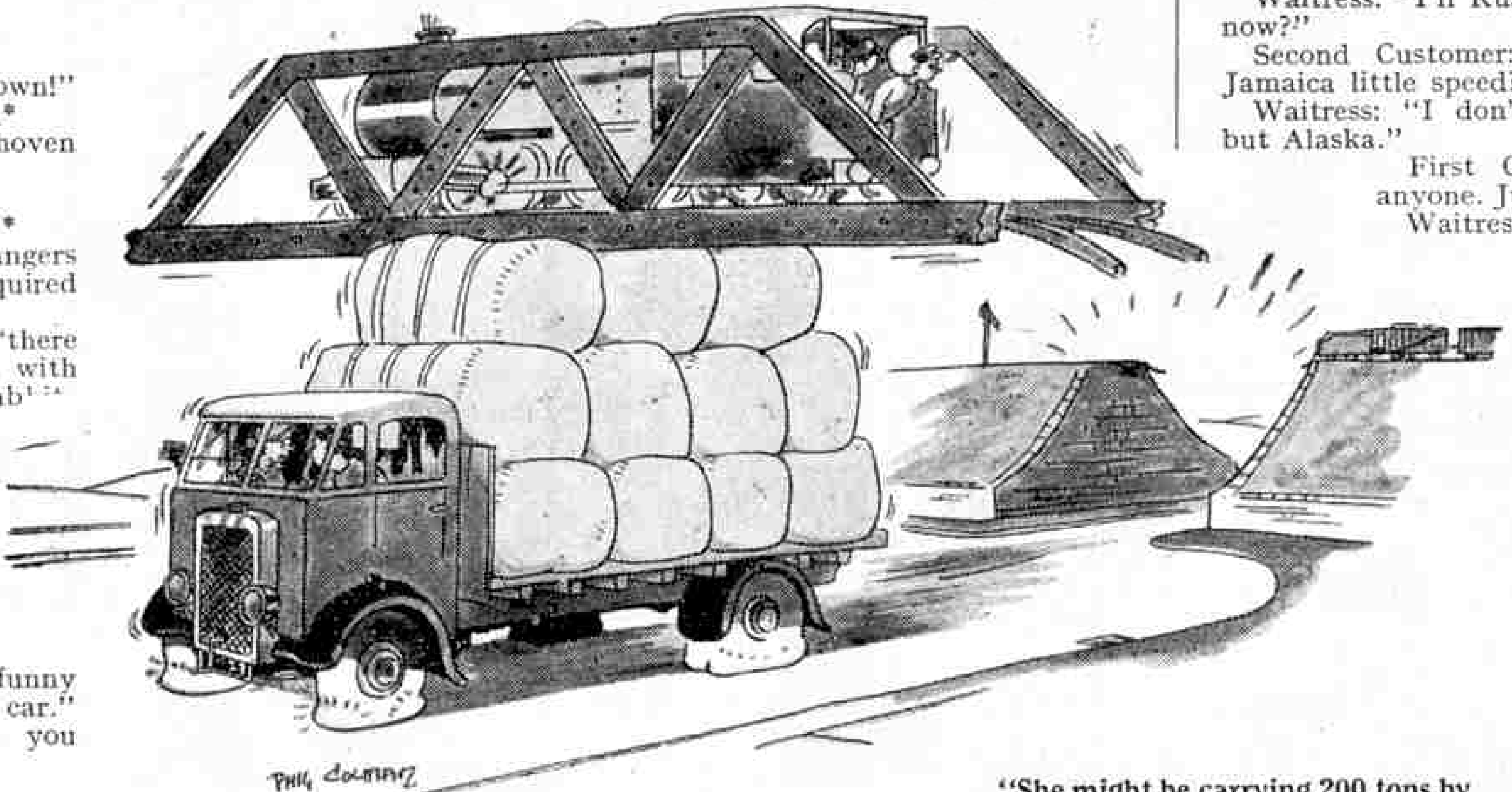
* * * *

Pat: "Have you forgotten about that five shillings you owe me?"
Ted: "Not yet. Give me time."

MATCH

Mike: "That's a queer pair of stockings you have on, Pat—one red and the other green."
Pat: "Yes, and I've another pair like it at home."

* * * *

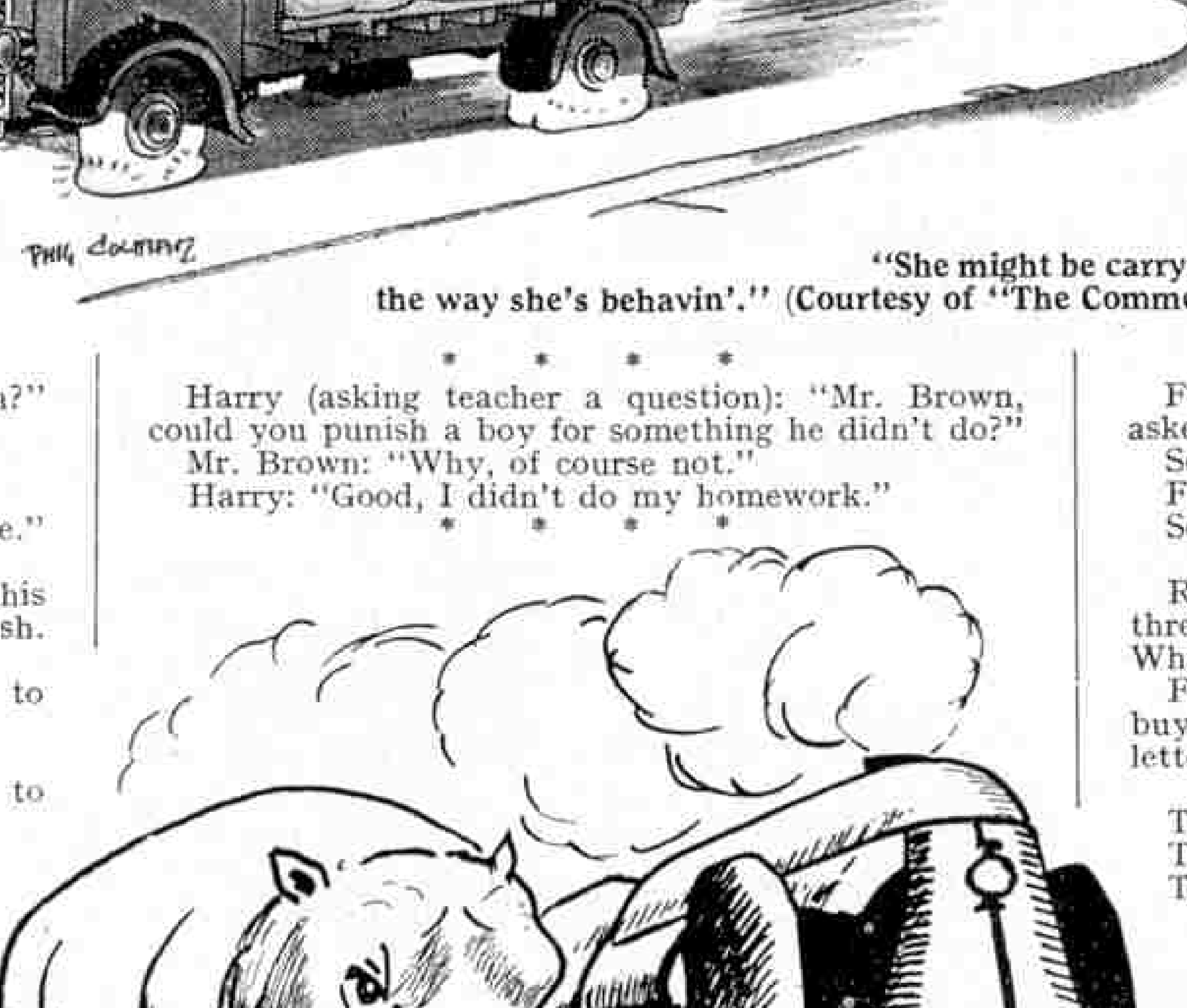


"She might be carrying 200 tons by the way she's behavin'." (Courtesy of "The Commercial Motor.")

* * * *

Harry (asking teacher a question): "Mr. Brown, could you punish a boy for something he didn't do?"
Mr. Brown: "Why, of course not."
Harry: "Good, I didn't do my homework."

* * * *



Origin of Streamline

(Courtesy of "The Railway Gazette.")

* * * *

"Is there anything you can do better than anyone else?"
"Yes," replied the small boy, "I kin read my own writing."

* * * *

Sergeant-major: "When did you blow in?"
New Recruit: "I came in with the last draft, sir."

* * * *

THIS MONTH'S HOWLER

A triangle is a three-sided thing pointed at the top.

HELP!

Two men entered a cafe.
Waitress: "Hawaii, gentleman? You must be Hungary!"
First Customer: "Yes, Siam, and we can't Roumania long. Venice tea ready?"
Waitress: "I'll Russia to a table. Will you Havana now?"
Second Customer: "Anything at all, but can't Jamaica little speed?"
Waitress: "I don't think we can Fiji that fast, but Alaska."
First Customer: "Never mind asking anyone. Just put a Cuba sugar in my Java."
Waitress: "Sweden it yourself. I'm only here to Servia."

* * *

First Motor Mechanic: "Which do you prefer, leather or fabric upholstery?"
Second Ditto: "I like fabrics; leather is too hard to wipe your hands on."

* * *

Tommy, aged fourteen, set out to get a job. He asked a foreman of a local engineering works for one.
"What can you do, Sonny?" asked the foreman.
"Anything," replied Tommy.
"Can you file smoke?" asked the foreman.
"Yes, sir," replied Tommy with a grin, "if you'll screw it in the vice for me."
He got the job!

* * * *

Father: "Well, what did the Boss say when you asked for your rise?"
Son: "He took it like a lamb."
Father: "Good! What did he say?"
Son: "Bah!"

* * * *

Rustic (meeting friend): "Wot be 'ee goin' ter walk three miles to Woodmucket to post a letter for? Why don't 'ee post it in the village 'ere?"
Friend: "Not me! The postmistress 'ave stopped buying my eggs, so I bain't a goin' to post no more letters with she."

* * * *

Tom: "Did you see me get in the bus?"
Tim: "Yes."
Tom: "Do you know who I am?"
Tim: "No."
Tom: "Then how did you know it was me that got in the bus?"

* * * *

Prospective Purchaser (trying second-hand typewriter): "The capital 'I' is very much worn on this machine."
Dealer: "Well, you see, Sir, it used to belong to a well-known actor who wrote for the papers a good deal."

* * * *

"There was a young fisher named Fisher,
Who was fishing for fish in a fissure;
One day with a grin a fish pulled him in,
Now they're fishing the fissure for Fisher."

* * * *

Dentist (drilling away): "Why, this tooth has gold in it! I didn't know it had been filled."
Patient: "It hasn't. That's my back collar stud you've struck."

* * * *

Yankee: "Yeah, I sure belong to New York."
Briton: "I'm glad to hear it. I thought it belonged to you!"

* * * *

Teacher: "What does this sentence mean—"He was a well read man?"
Bright Pupil: "He was a healthy Red Indian."

* * * *

Tom: "Dad, I've got good news."
Dad: "Have you passed your examination?"
Tom: "Well, I didn't exactly pass, but I was top of those that failed."

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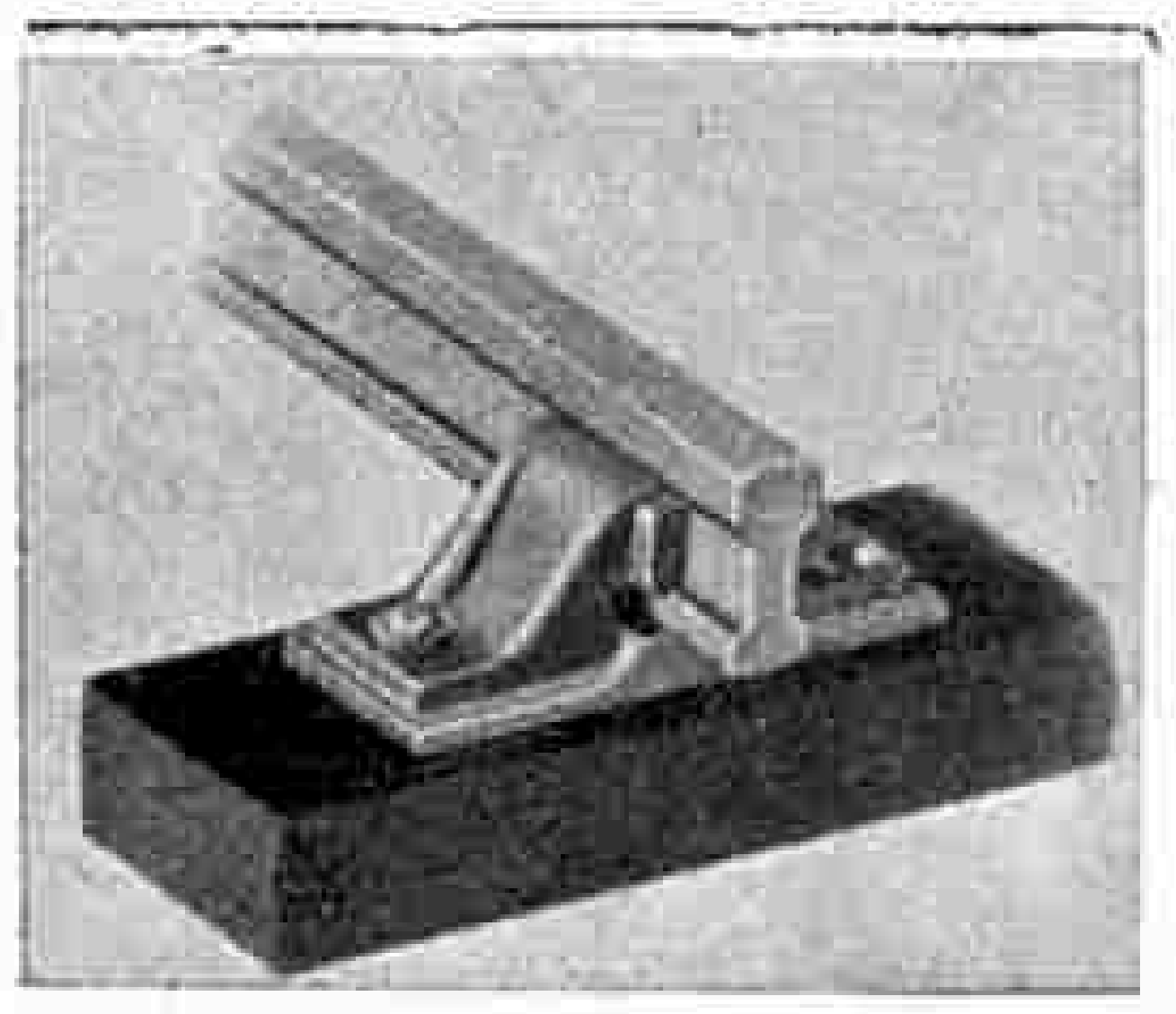

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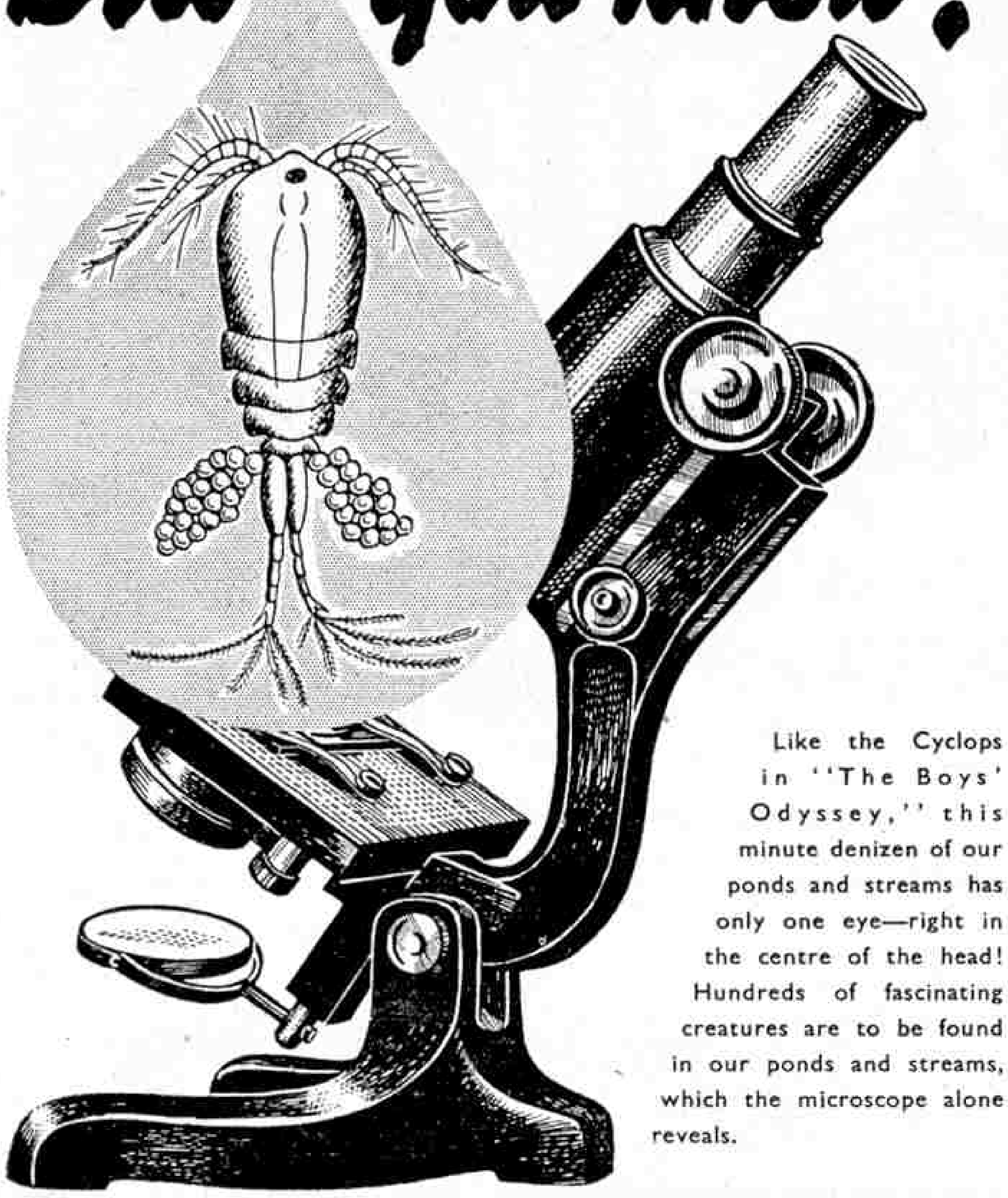

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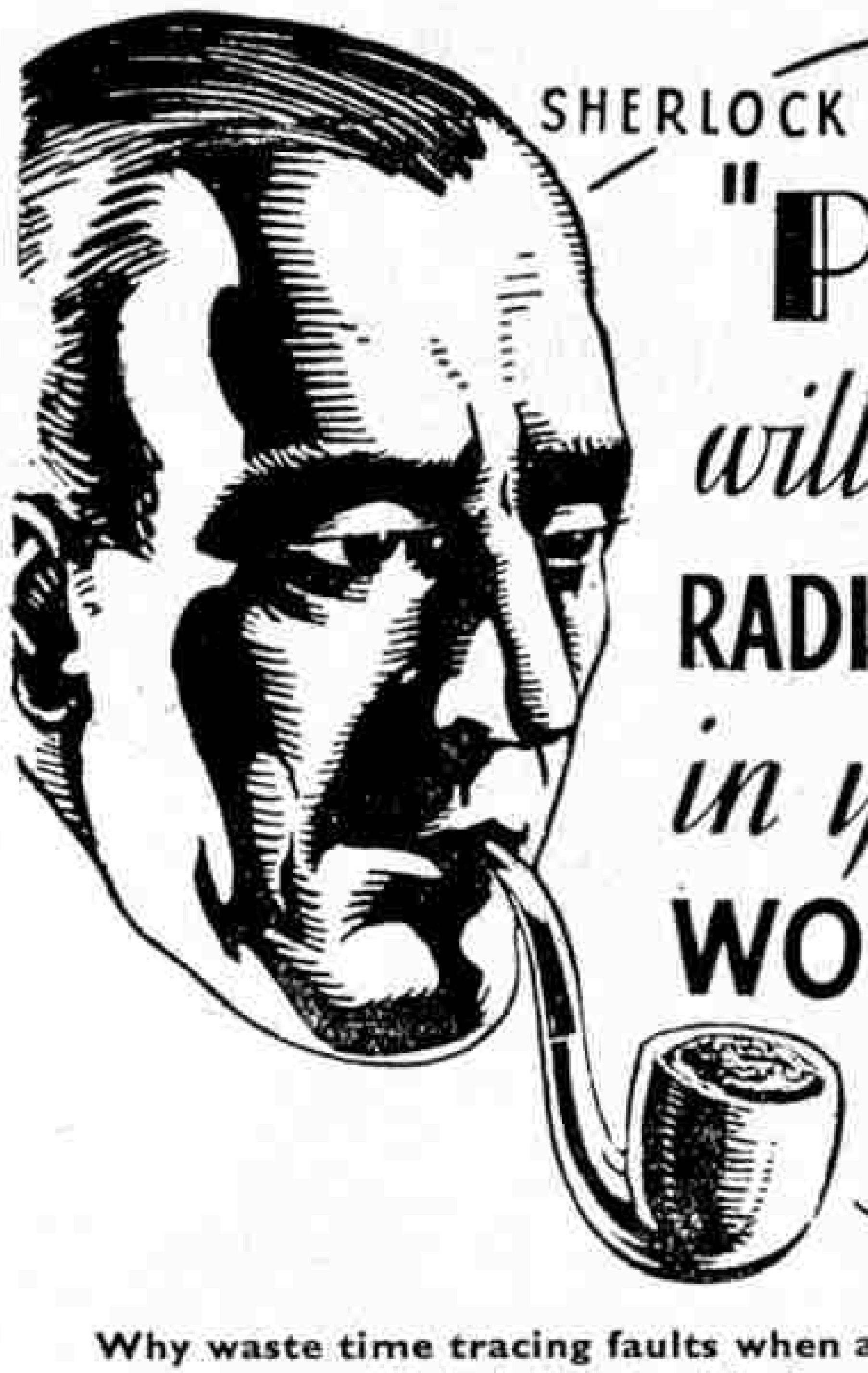

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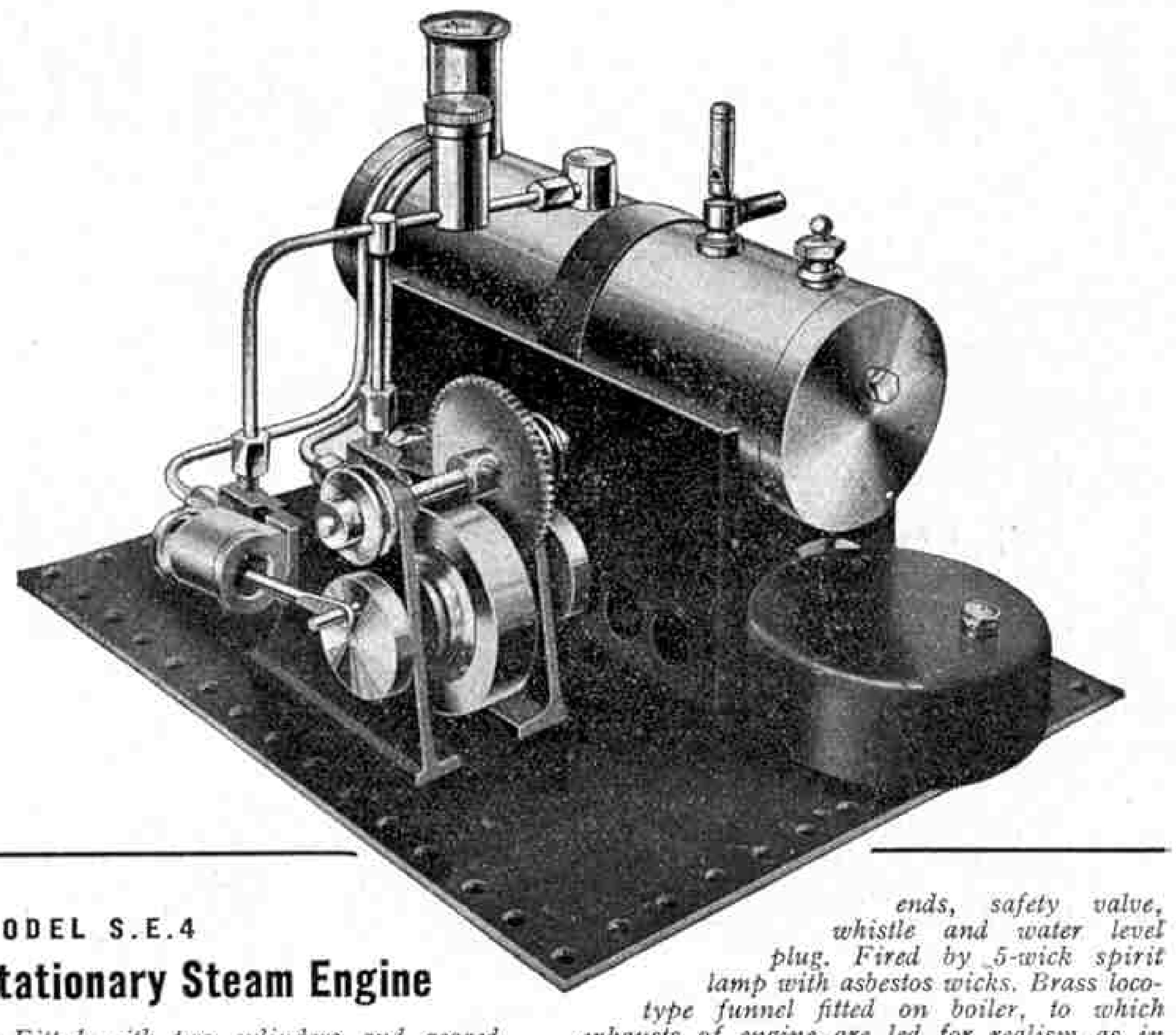

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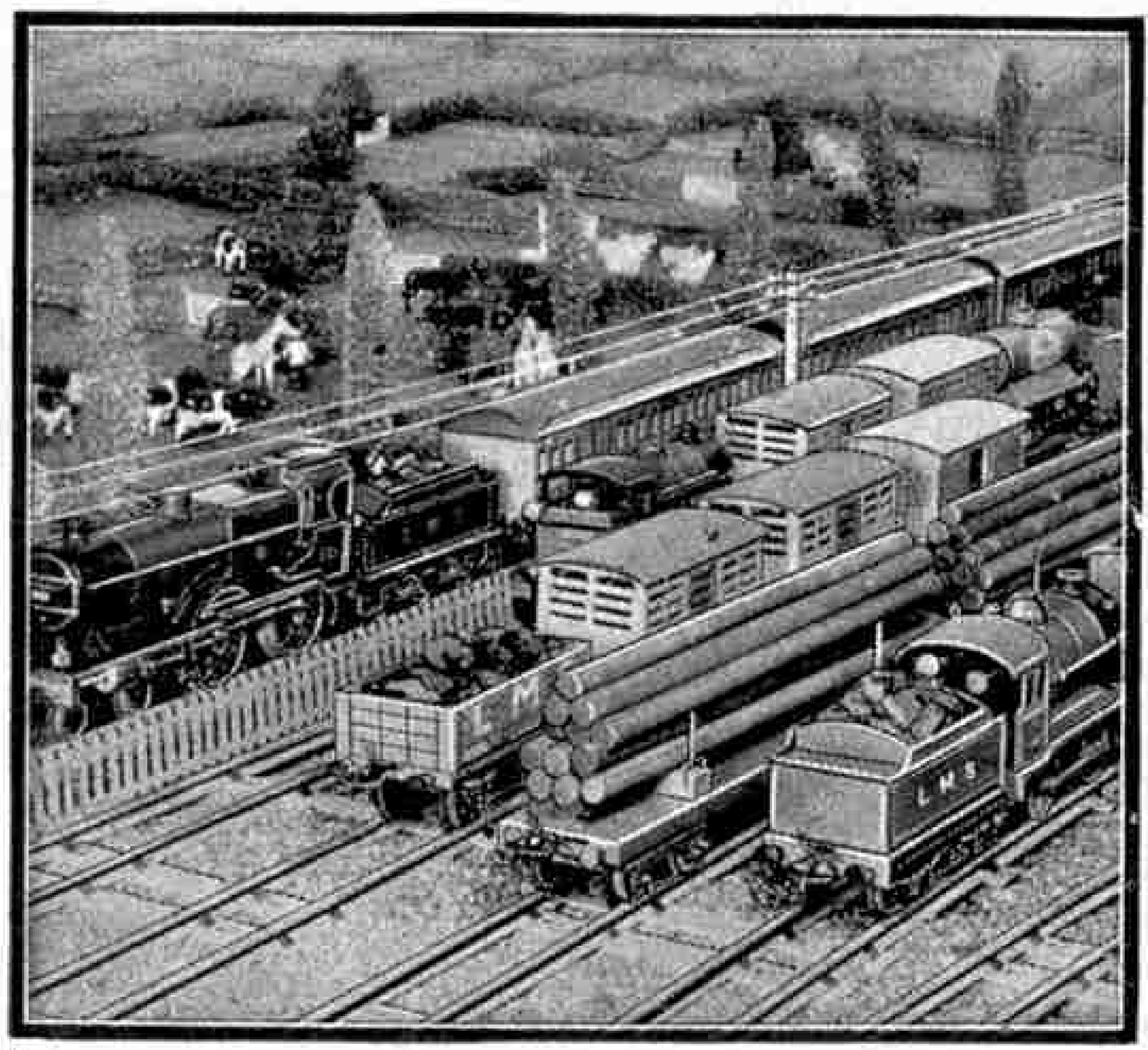

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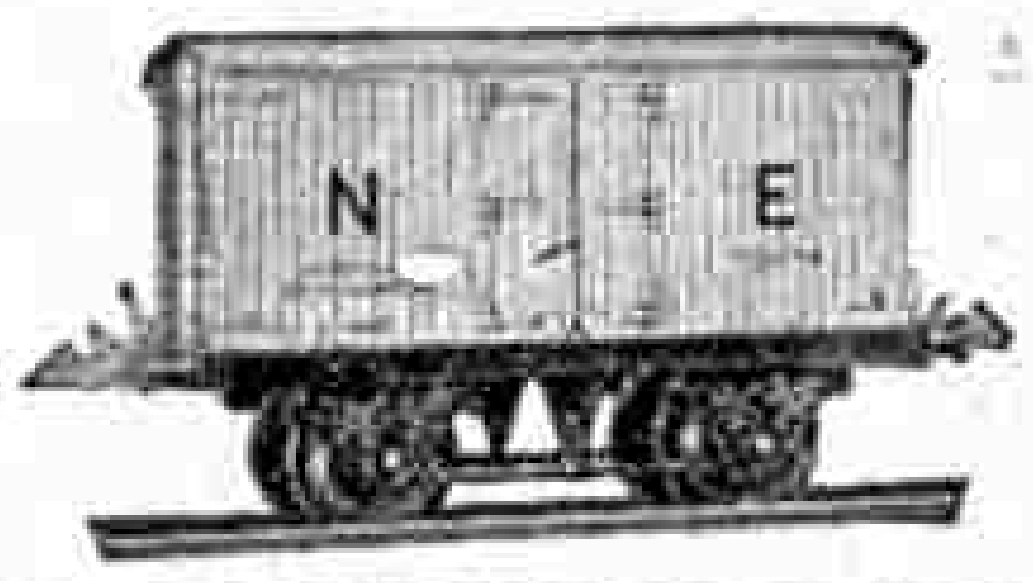

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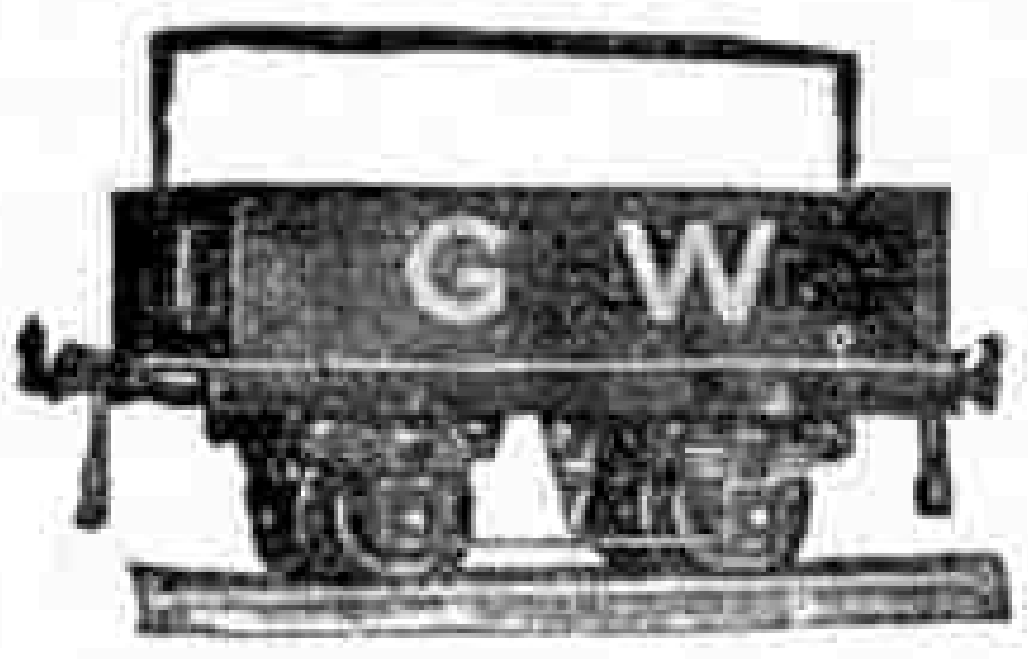
L.M.S., G.W., N.E. or S.R. Finished with the appropriate details. Price **1/6**



***OPEN WAGON "B"**
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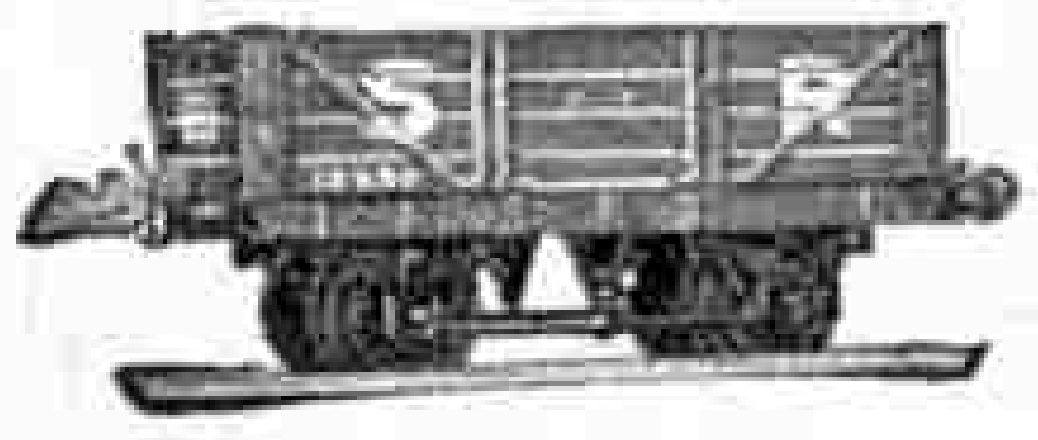
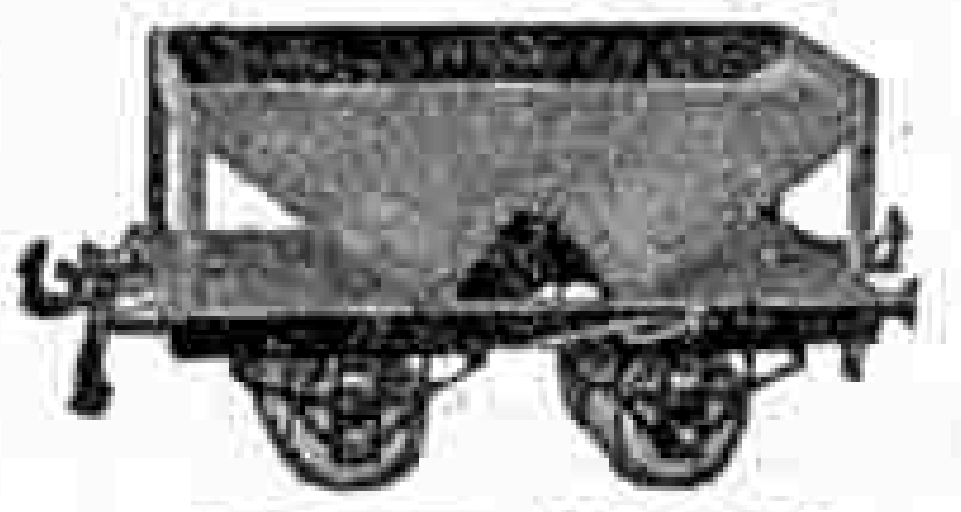
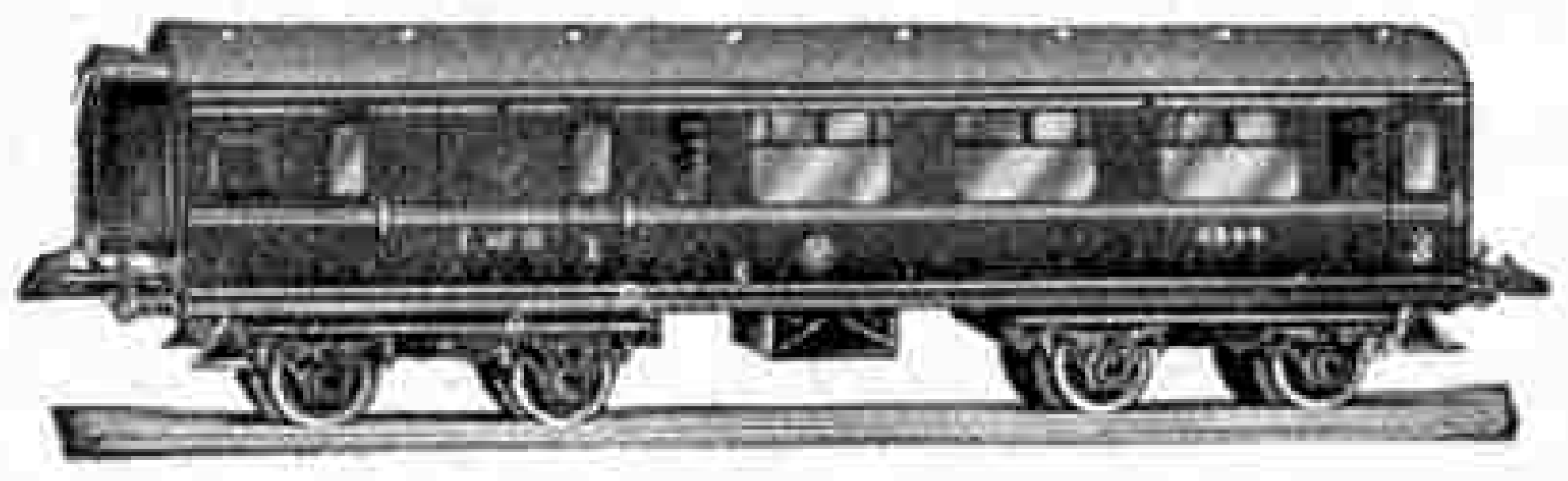


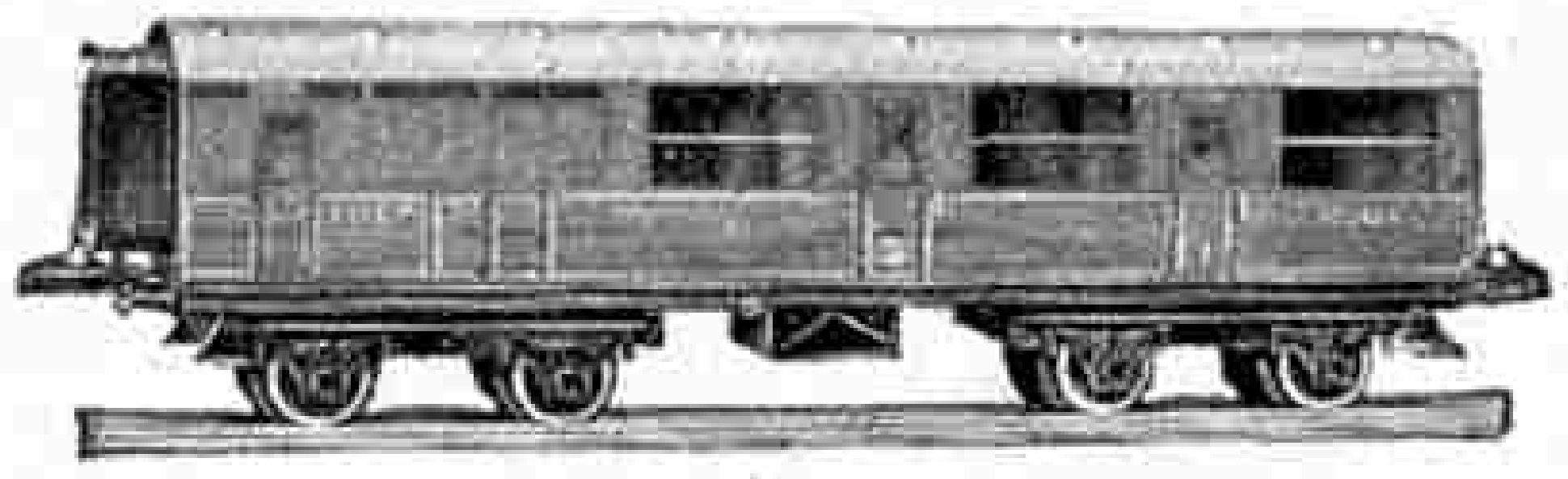
***No. 1 WAGON**
Price **1/6**



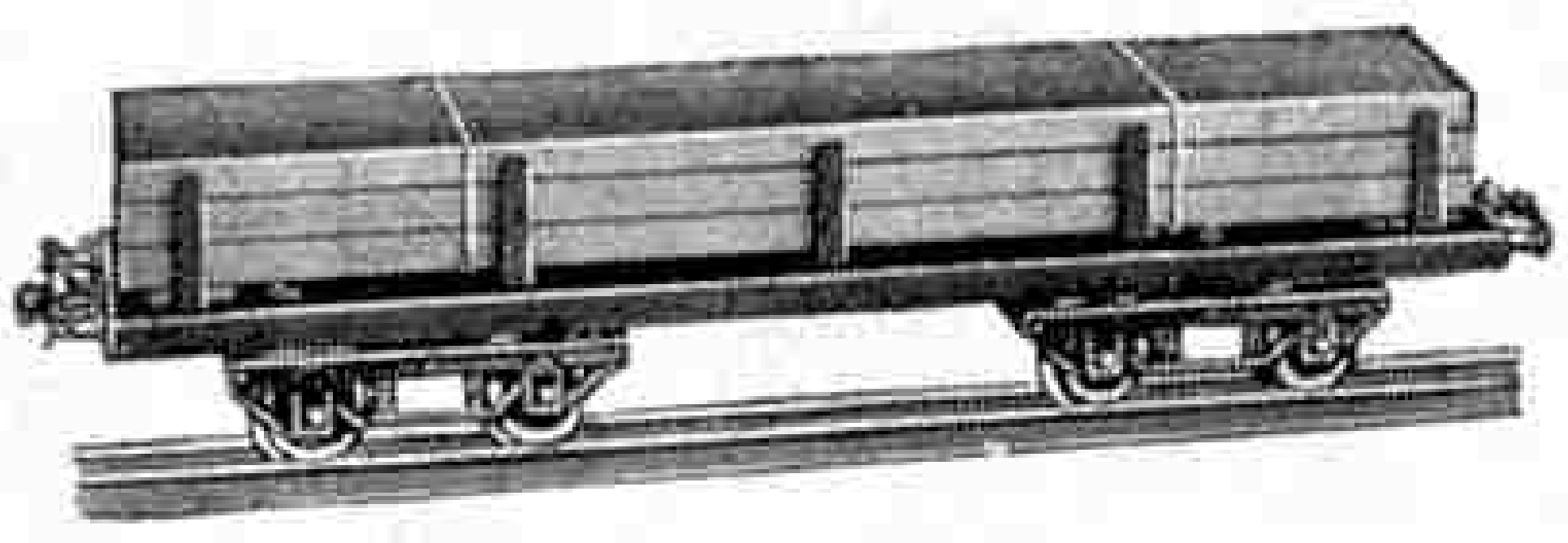
***HOPPER WAGON**
Mechanically unloaded. Price **3/-**



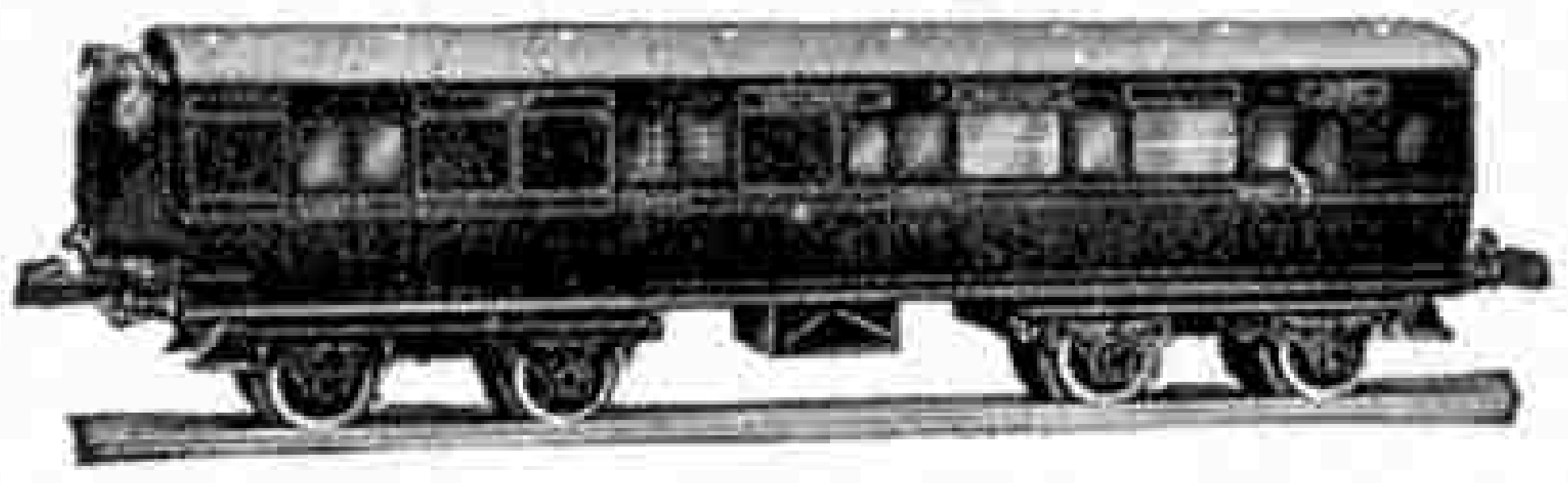
No. 2 CORRIDOR COACH
L.M.S. Brake-composite. Not suitable for 1 ft. radius rails. Price **7/6**



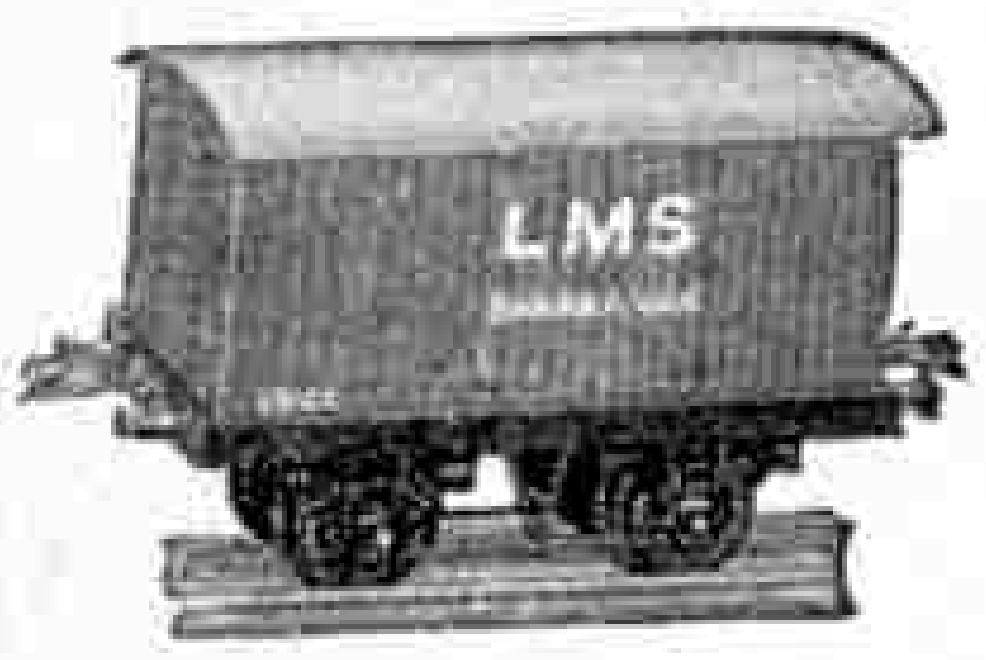
No. 2 CORRIDOR COACH
L.N.E.R. Brake-composite. Not suitable for 1 ft. radius rails. Price **7/6**



No. 2 TIMBER WAGON
Not suitable for 1 ft. radius rails. Price **2/6**



No. 2 CORRIDOR COACH
S.R. Brake-composite. Not suitable for 1 ft. radius rails. Price **7/6**



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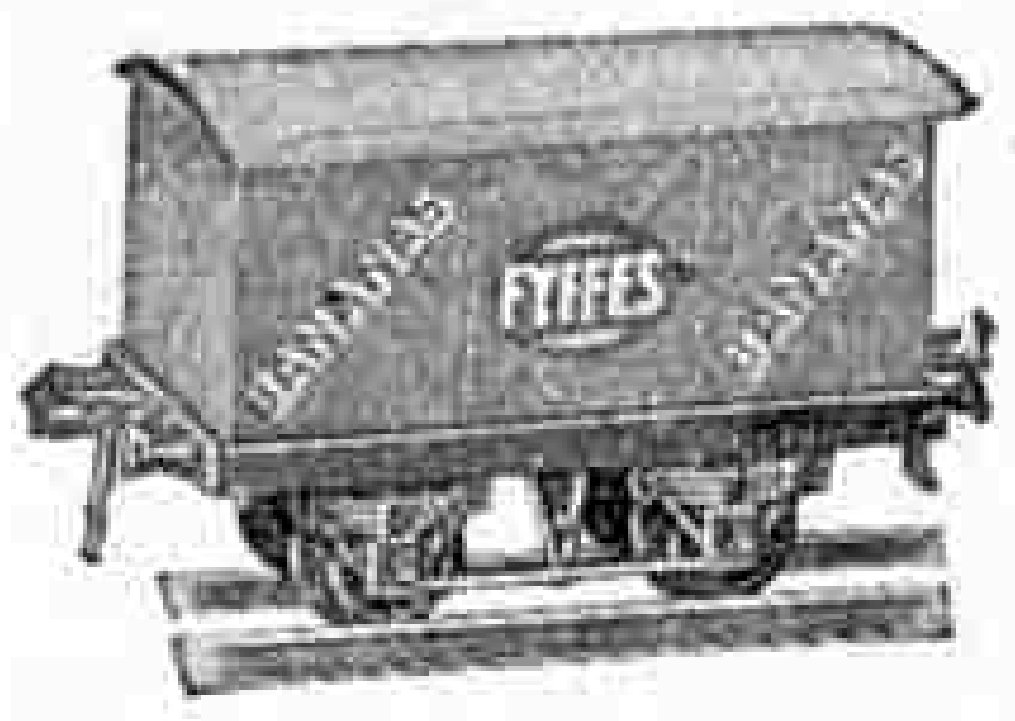
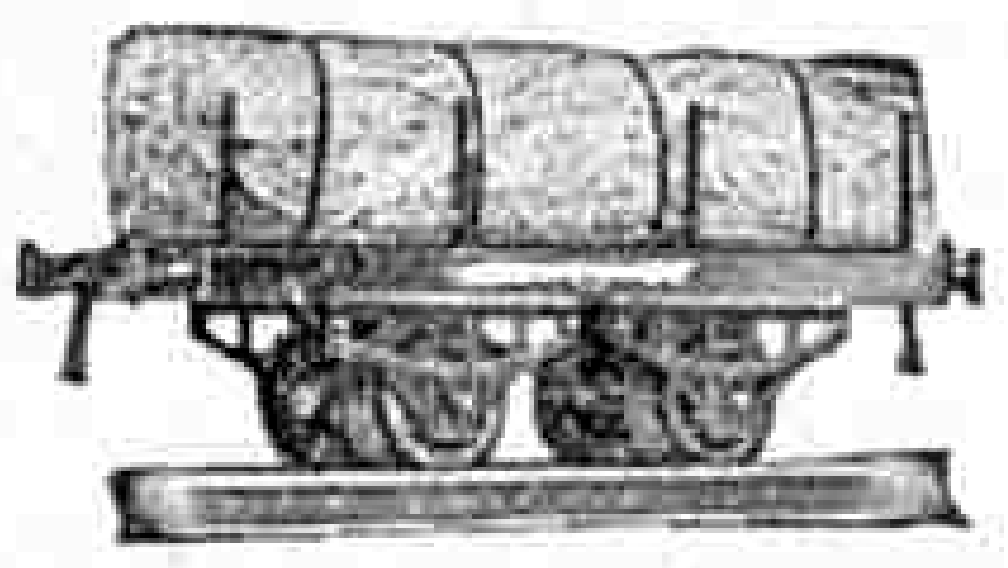
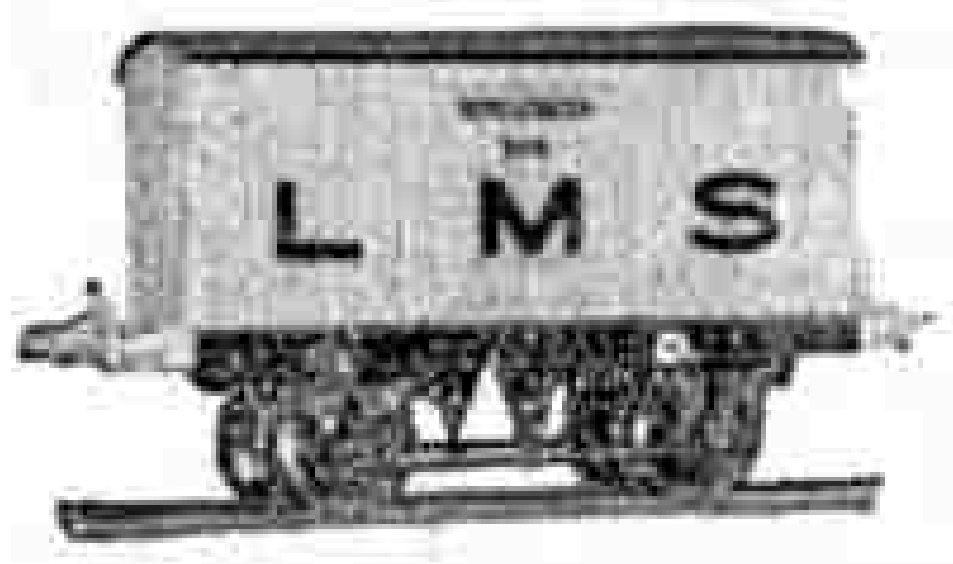


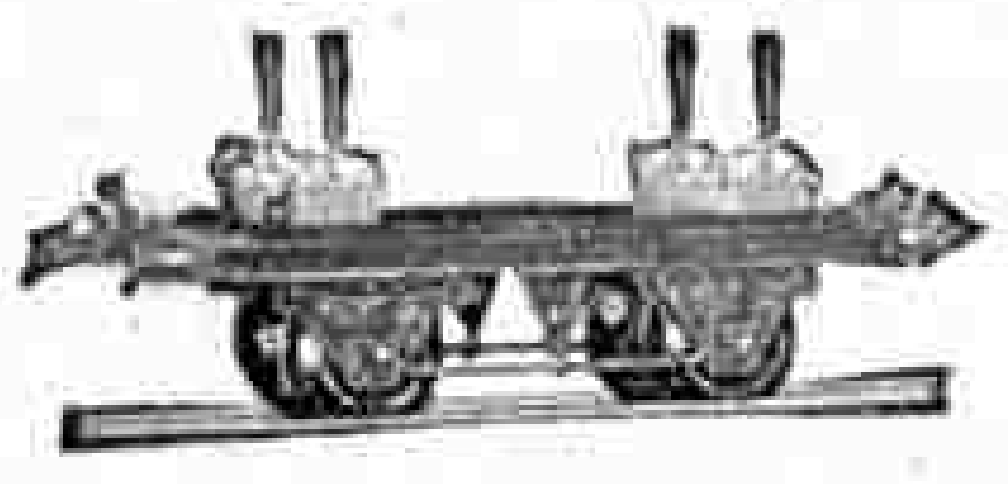
No. 1 BANANA VAN "FYFFES"
Sliding doors. Price **2/3**



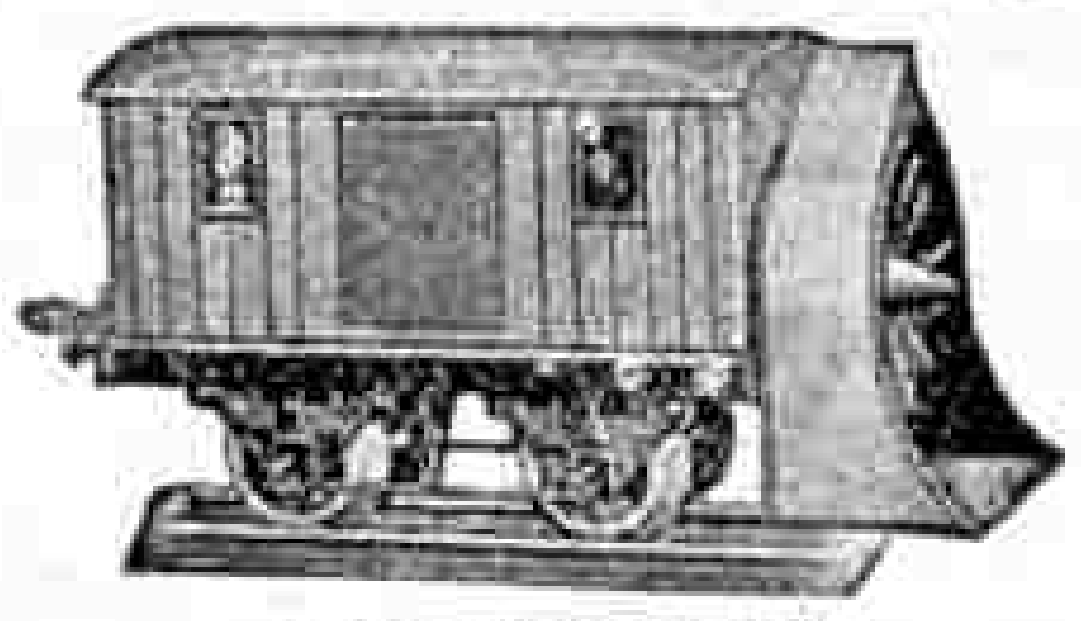
FIBRE WAGON
This is an interesting model of a type of wagon used in France and other European countries. Price **1/3**



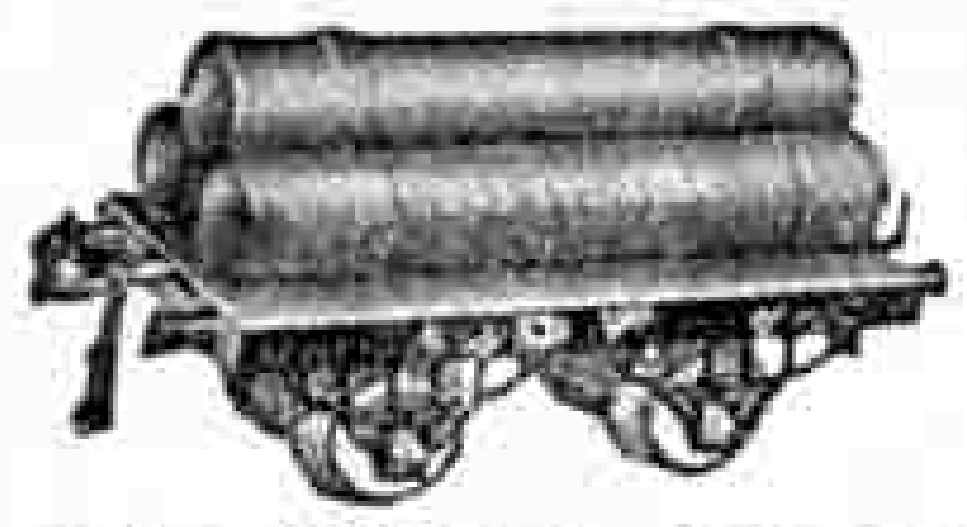
***REFRIGERATOR VAN No. 1**
Finished in white. With sliding doors. Price **2/3**



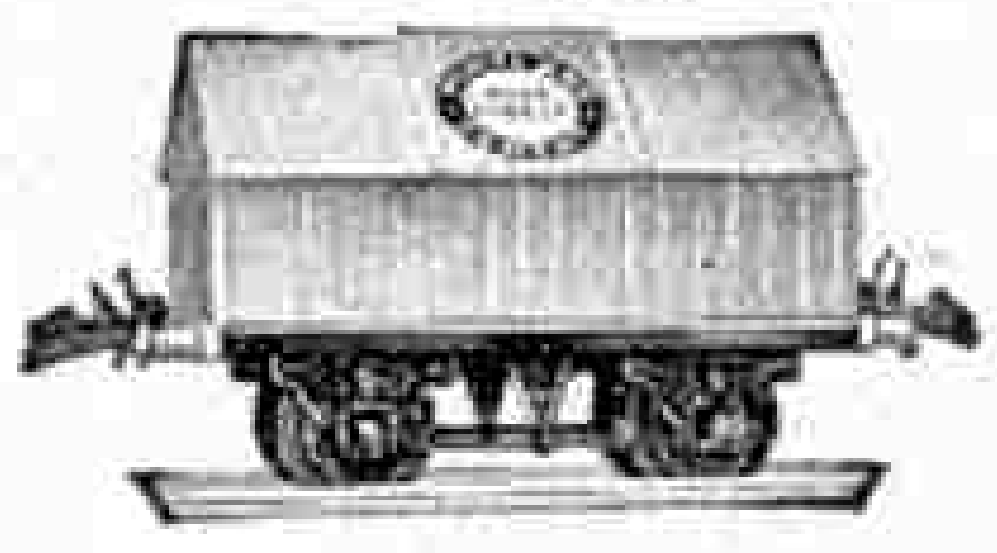
No. 1 LUMBER WAGON
Fitted with bolsters and stanchions for log transport. Price **1/3**



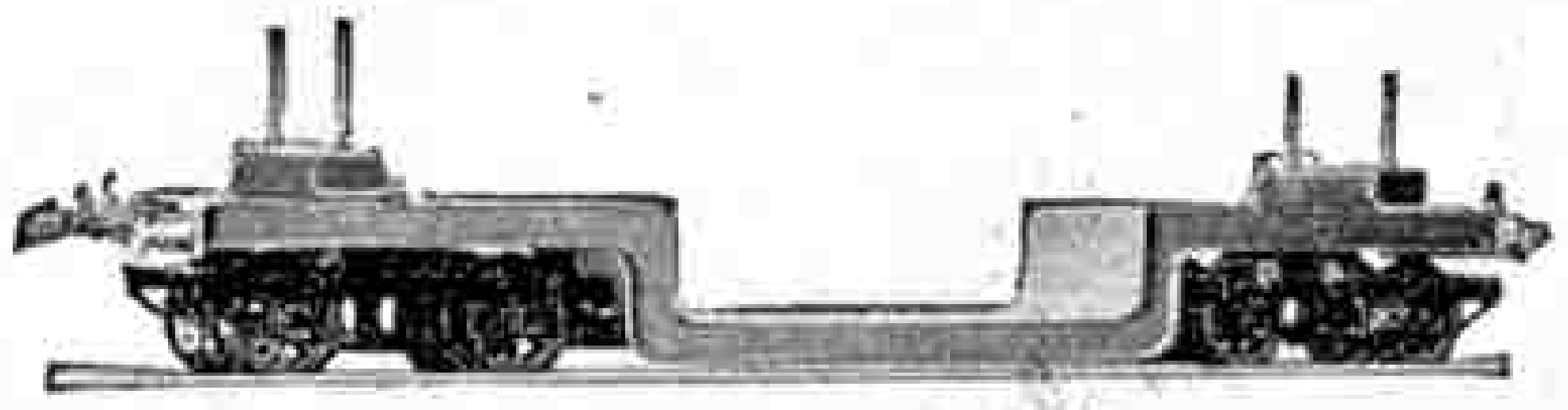
SNOW PLOUGH
With revolving plough. Price **3/11**



GAS CYLINDER WAGON
Finished in red, lettered gold. Price **1/8**

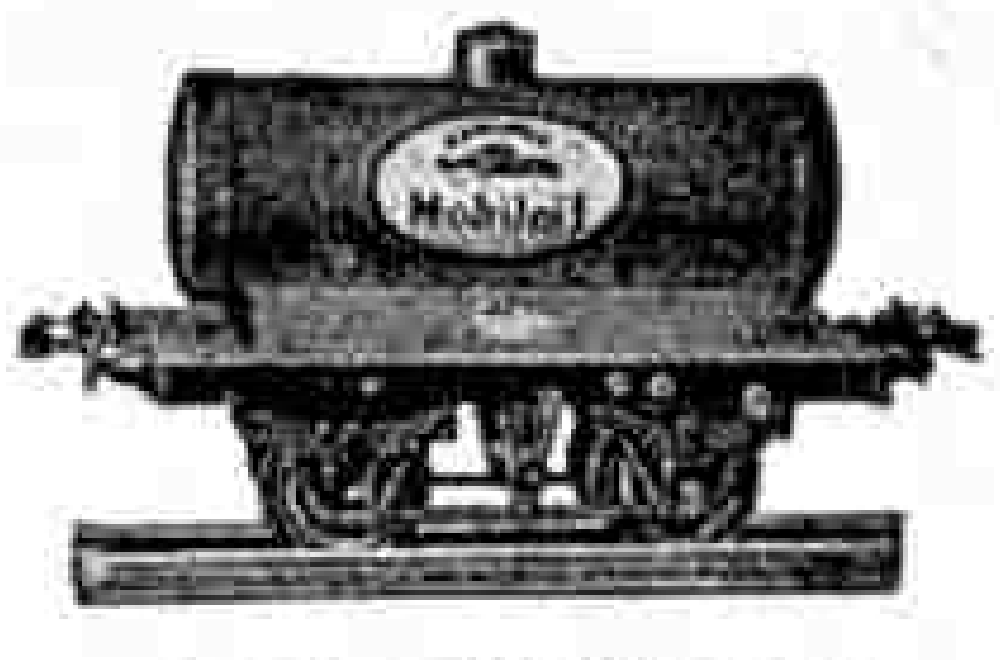


CEMENT WAGON
The door at the top opens. Finished in yellow. Lettered "Blue Circle" Portland Cement. Price **1/11**

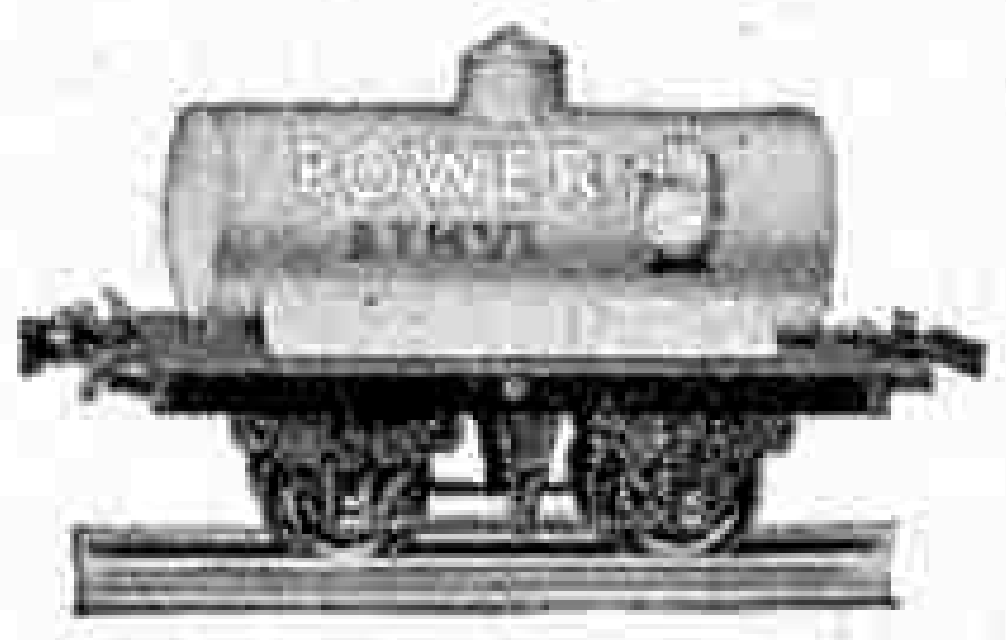


TROLLEY WAGON
Not suitable for 1 ft. radius rails. Price **4/-**

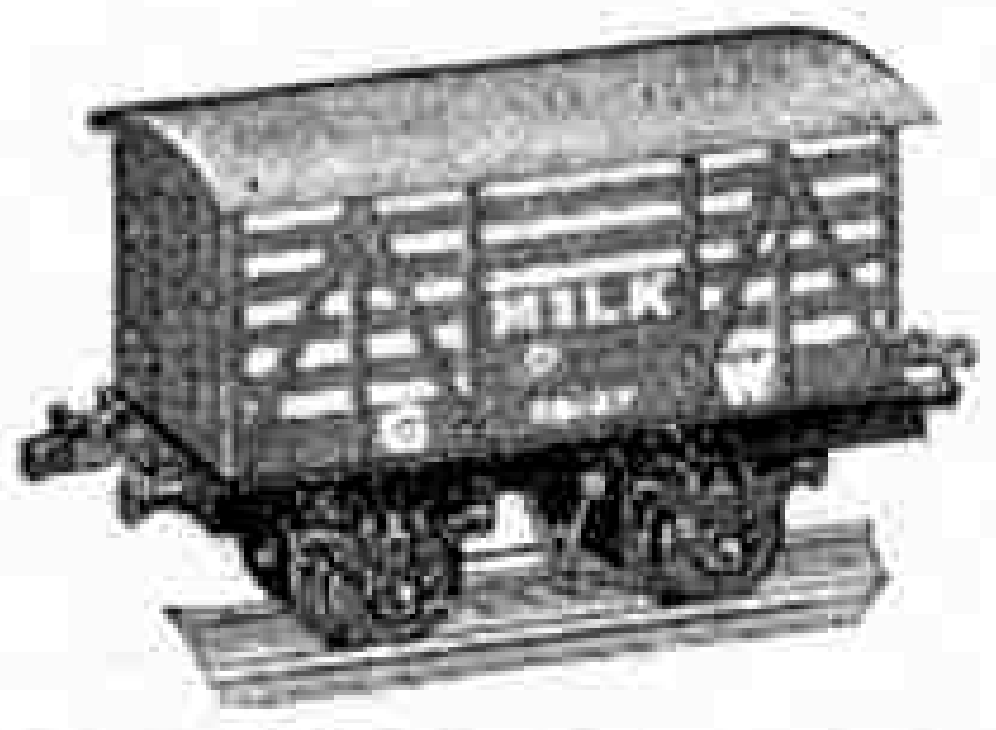
TROLLEY WAGON
Fitted with two Cable Drums. Price **4/6**



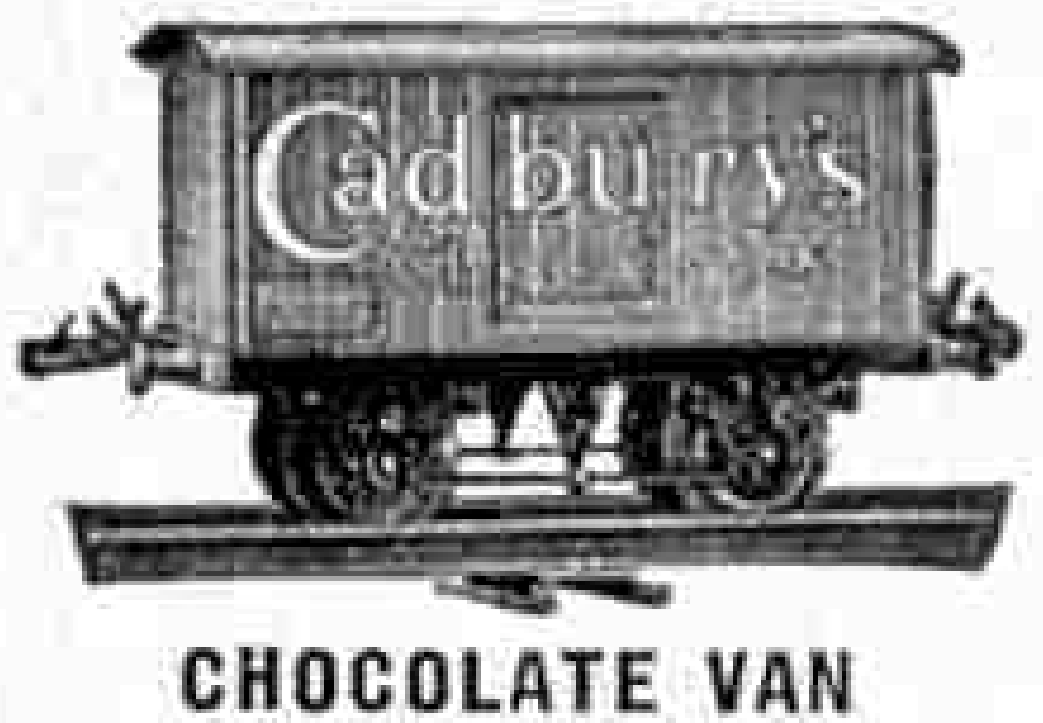
OIL TANK WAGON "MOBILOIL"
Finished in battleship grey. Price **1/11**



No. 1 PETROL TANK WAGON "POWER ETHYL"
Price **1/11**

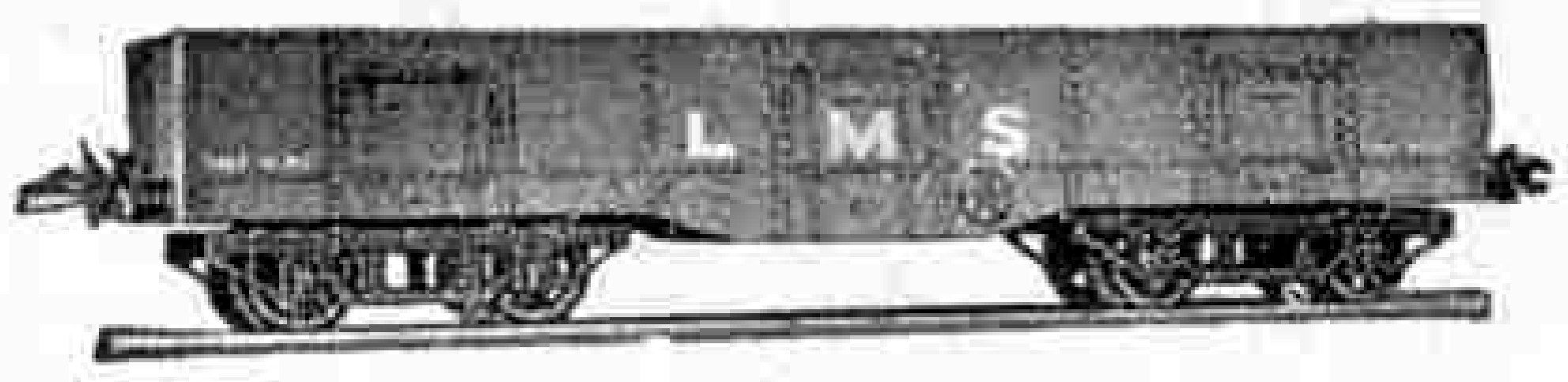


No. 0 MILK TRAFFIC VAN
An attractive model. Available lettered G.W. only. Price **1/6**

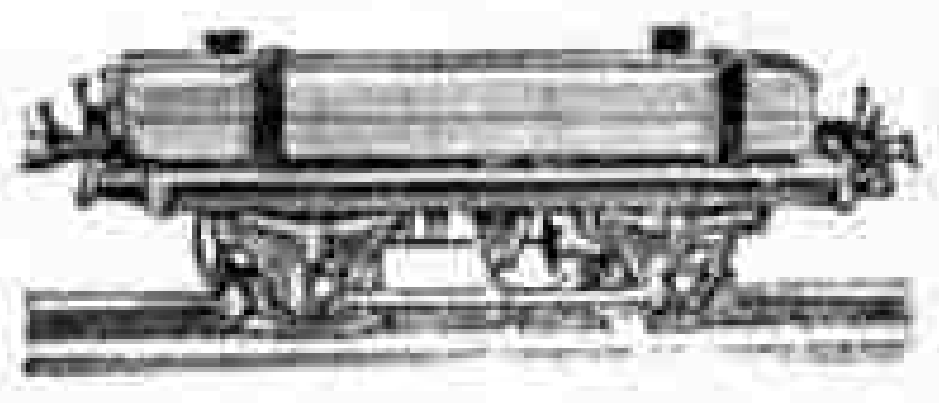


CHOCOLATE VAN "CADBURY'S"
This van is beautifully enamelled in blue with white roof. Price **2/3**

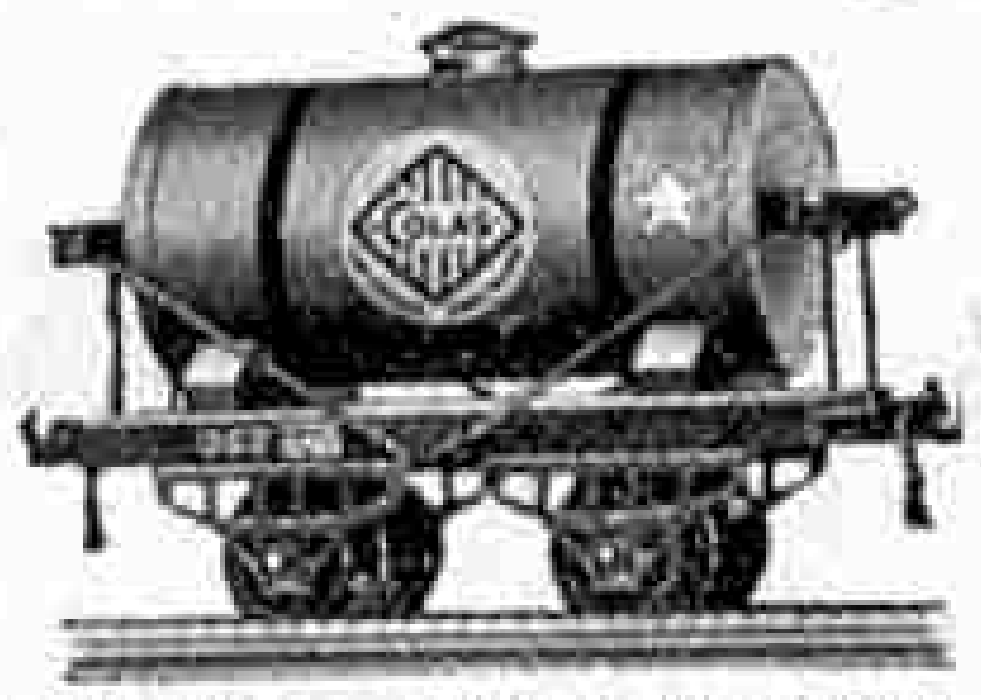
**Lettered L.M.S., N.E., G.W. or S.R.*



No. 2 HIGH CAPACITY WAGON
Finished in correct colours of G.W. and L.M.S. "Loco Coal" Wagons, or N.E. "Brick" Wagon. Not suitable for 1 ft. radius rails. Price **4/-**



No. 1 TIMBER WAGON
Beautifully enamelled in yellow and red. Price **1/3**



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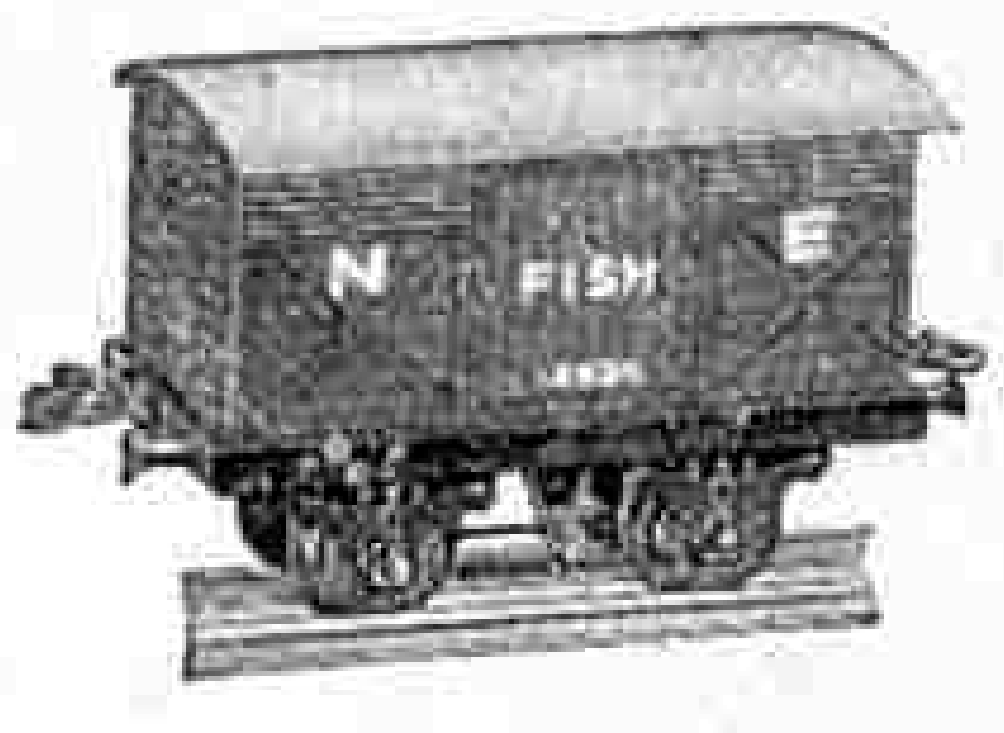
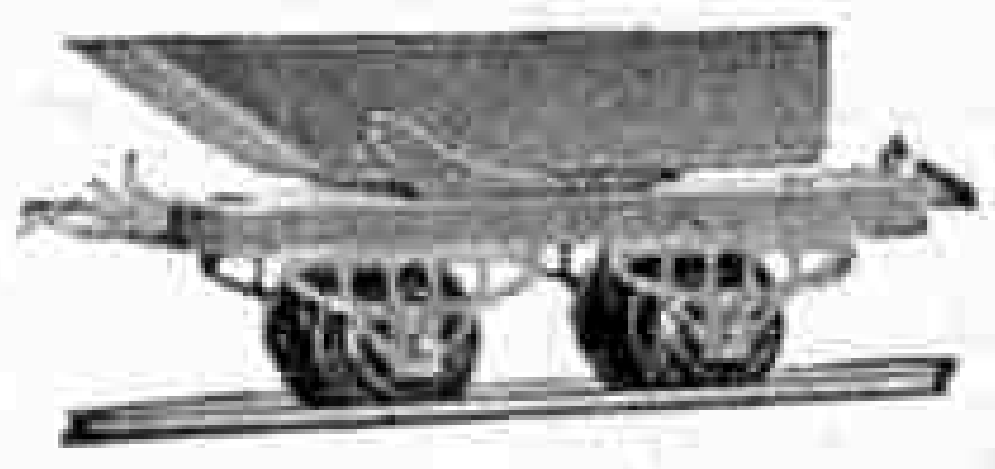
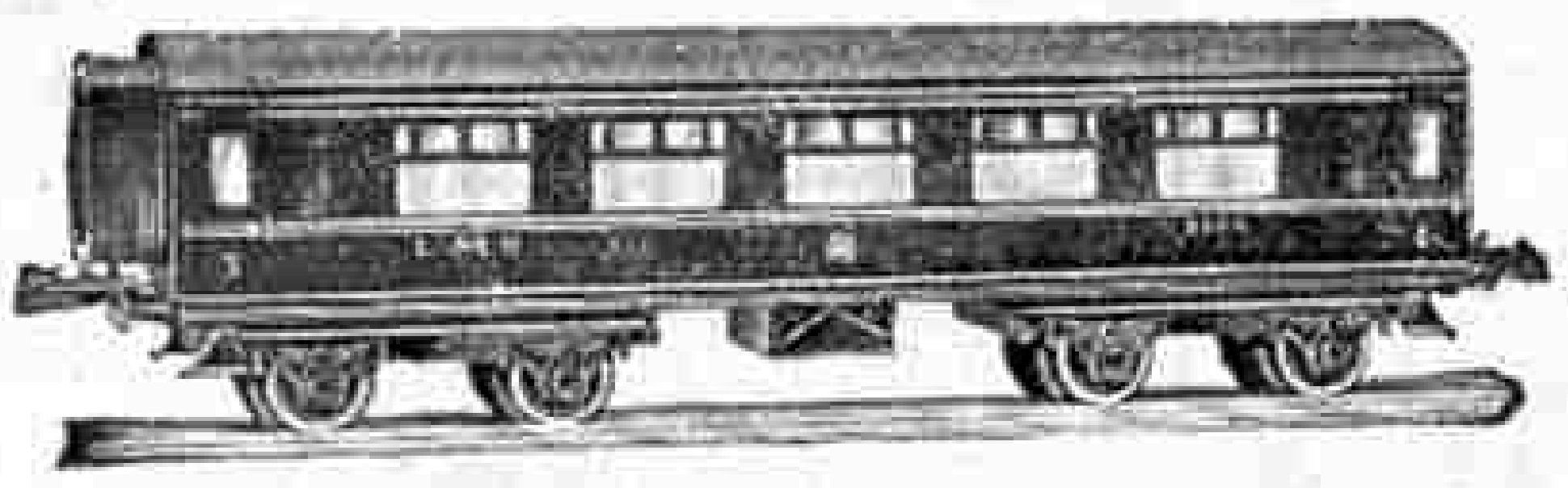
An attractive model with full detail. Price **4/-**



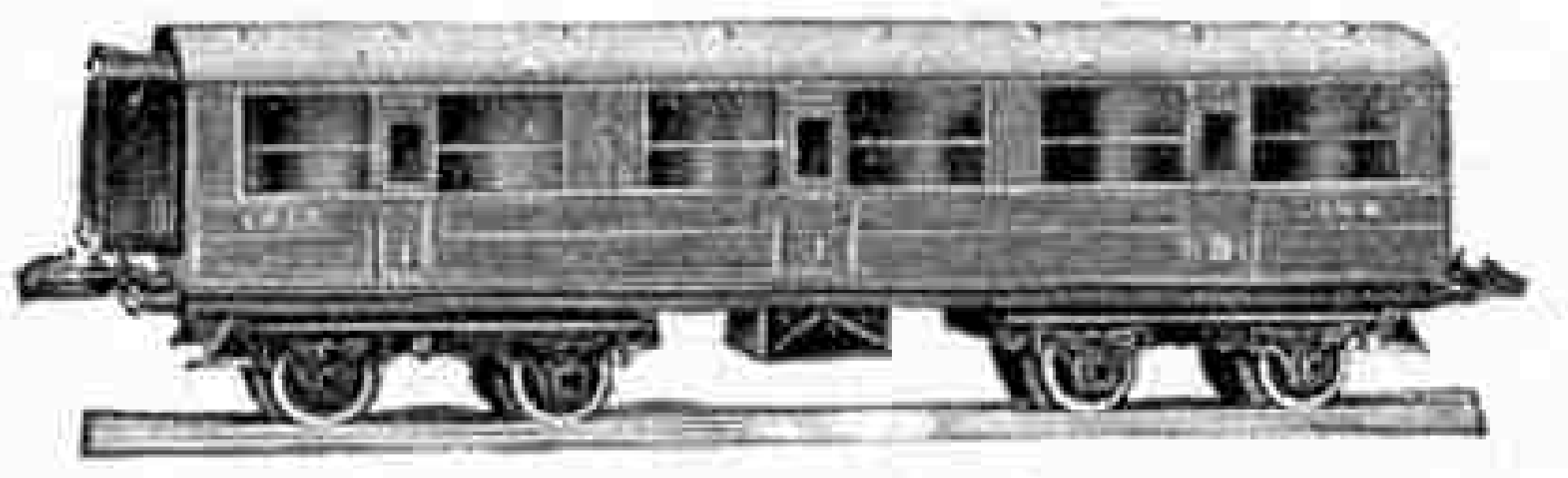
No. 0 FISH VAN
L.M.S., G.W. and N.E. Price **1/6**



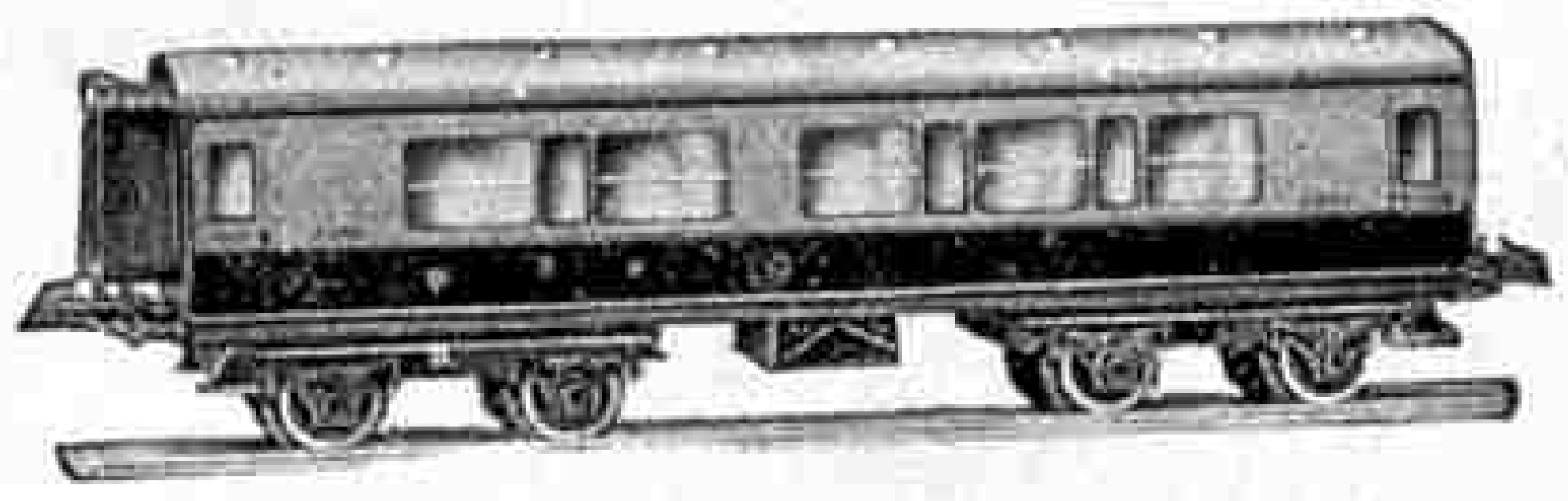
No. 0 ROTARY TIPPING WAGON
Container revolves and tips. Price **1/6**



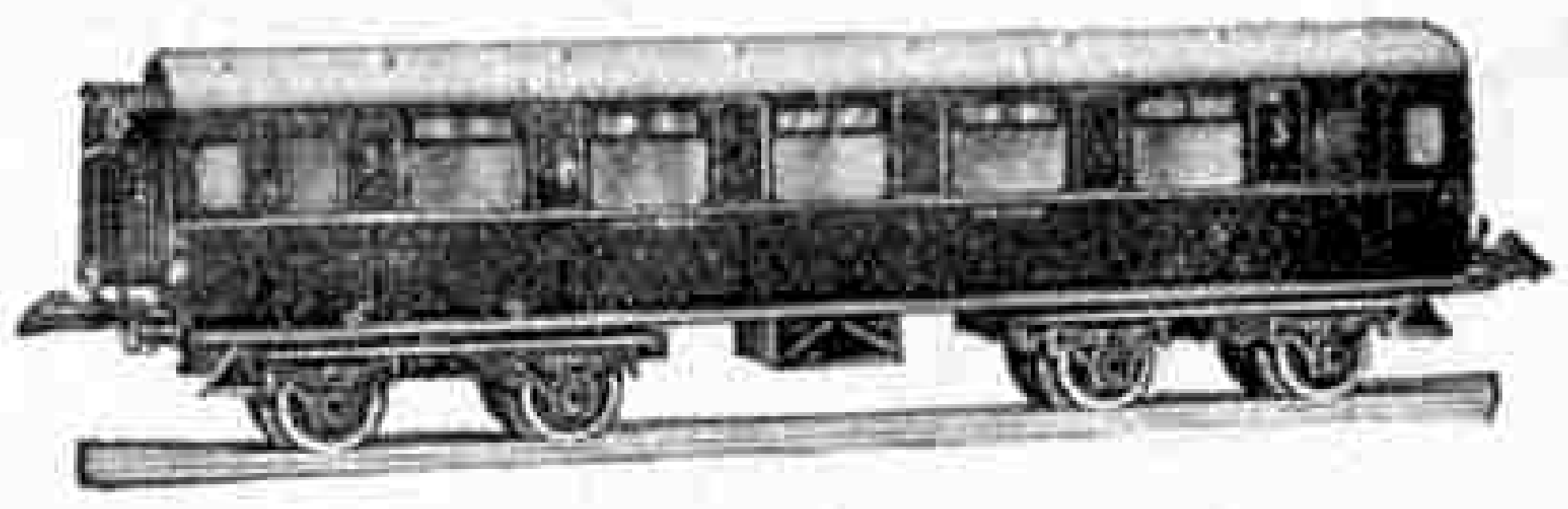
No. 2 CORRIDOR COACH
L.M.S. First-third. Not suitable for 1 ft. radius rails. Price **7/6**



No. 2 CORRIDOR COACH
L.N.E.R. First-third. Not suitable for 1 ft. radius rails. Price **7/6**



No. 2 CORRIDOR COACH
G.W.R. First-third. Not suitable for 1 ft. radius rails. Price **7/6**



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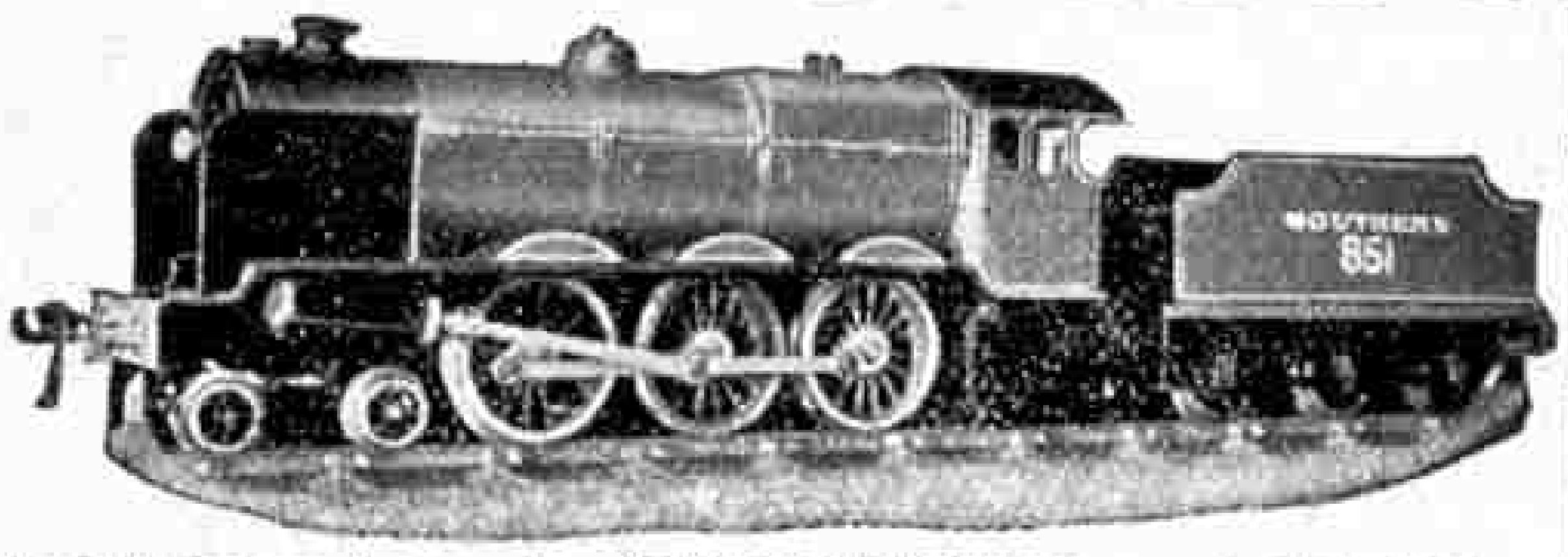

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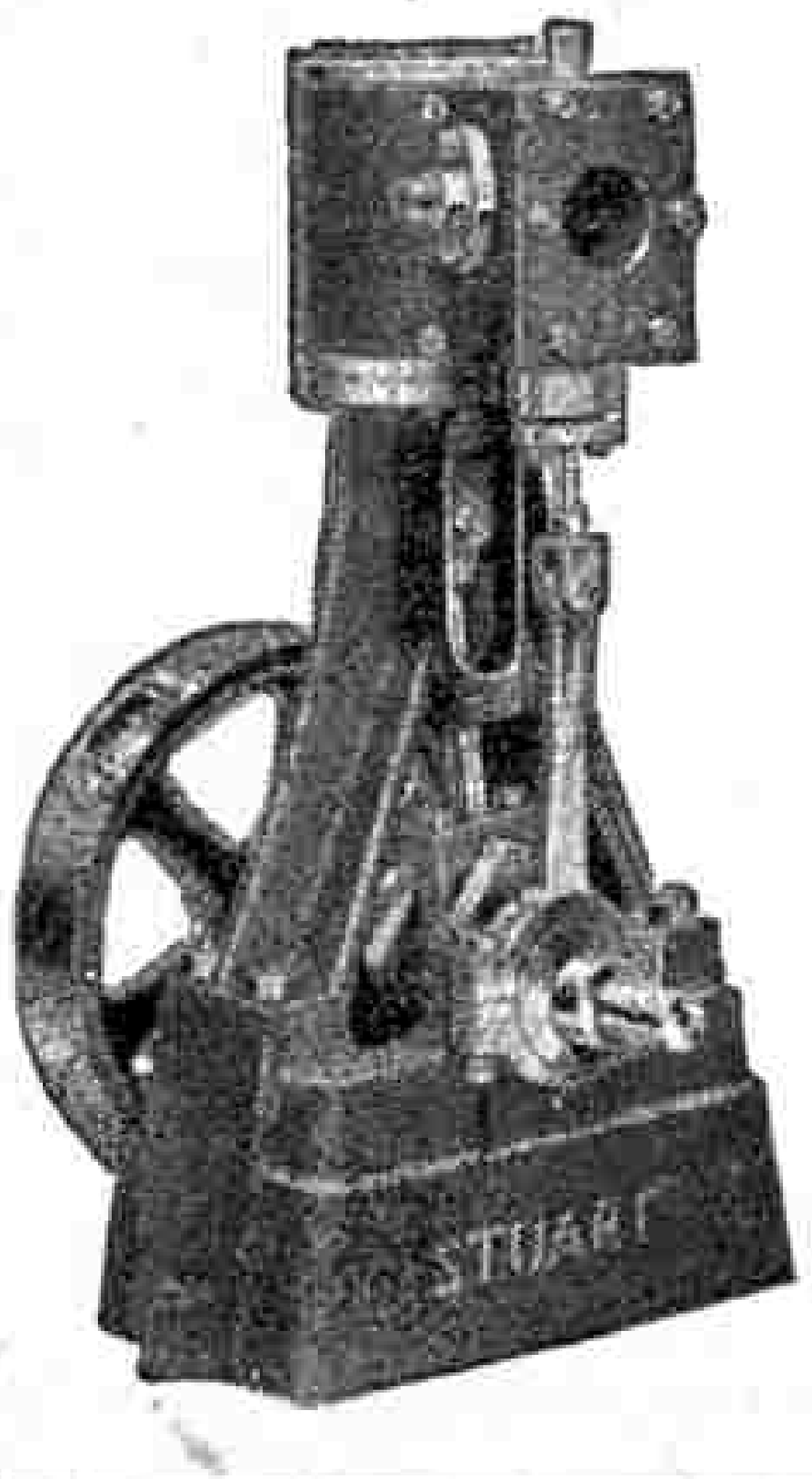

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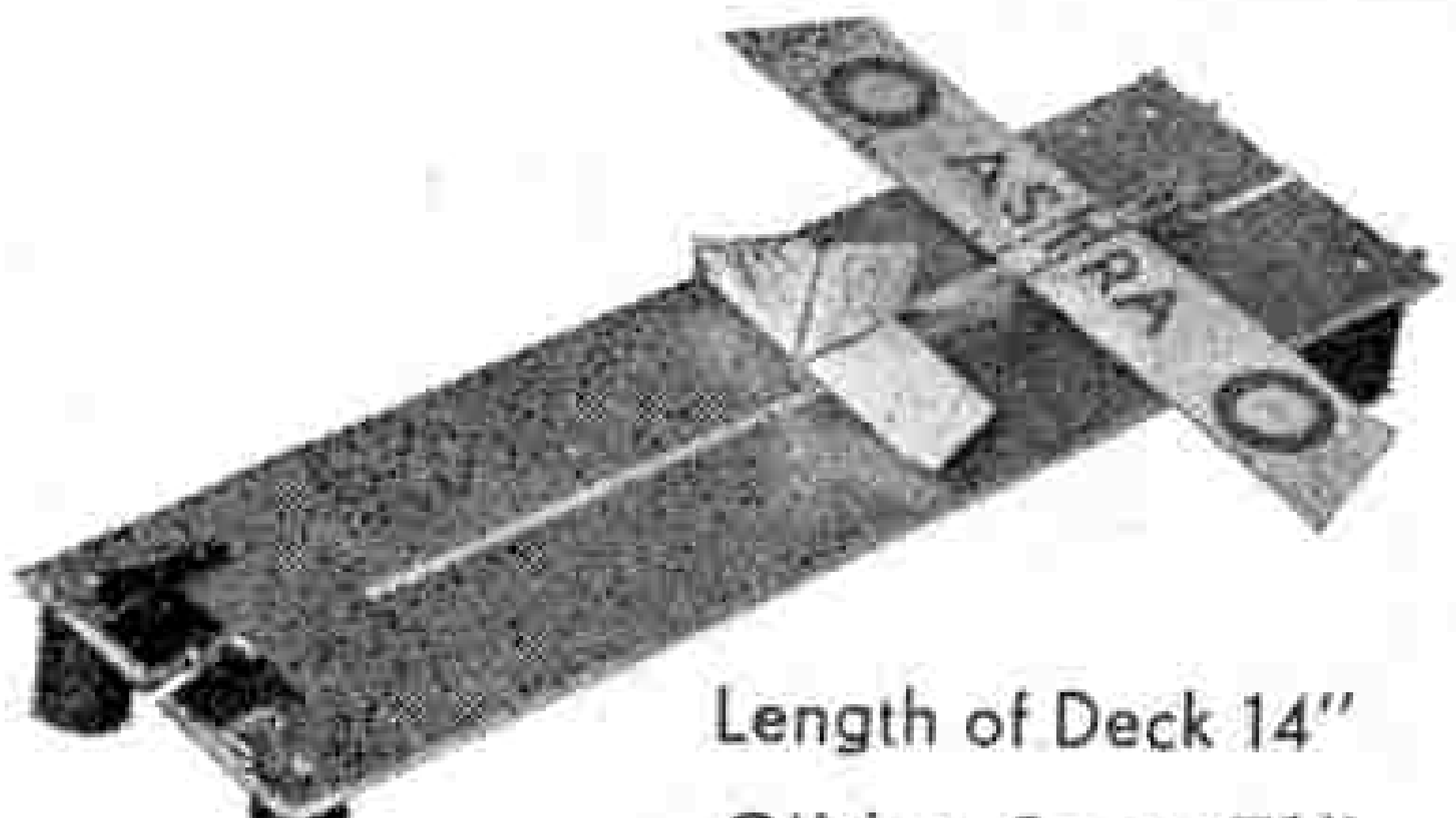

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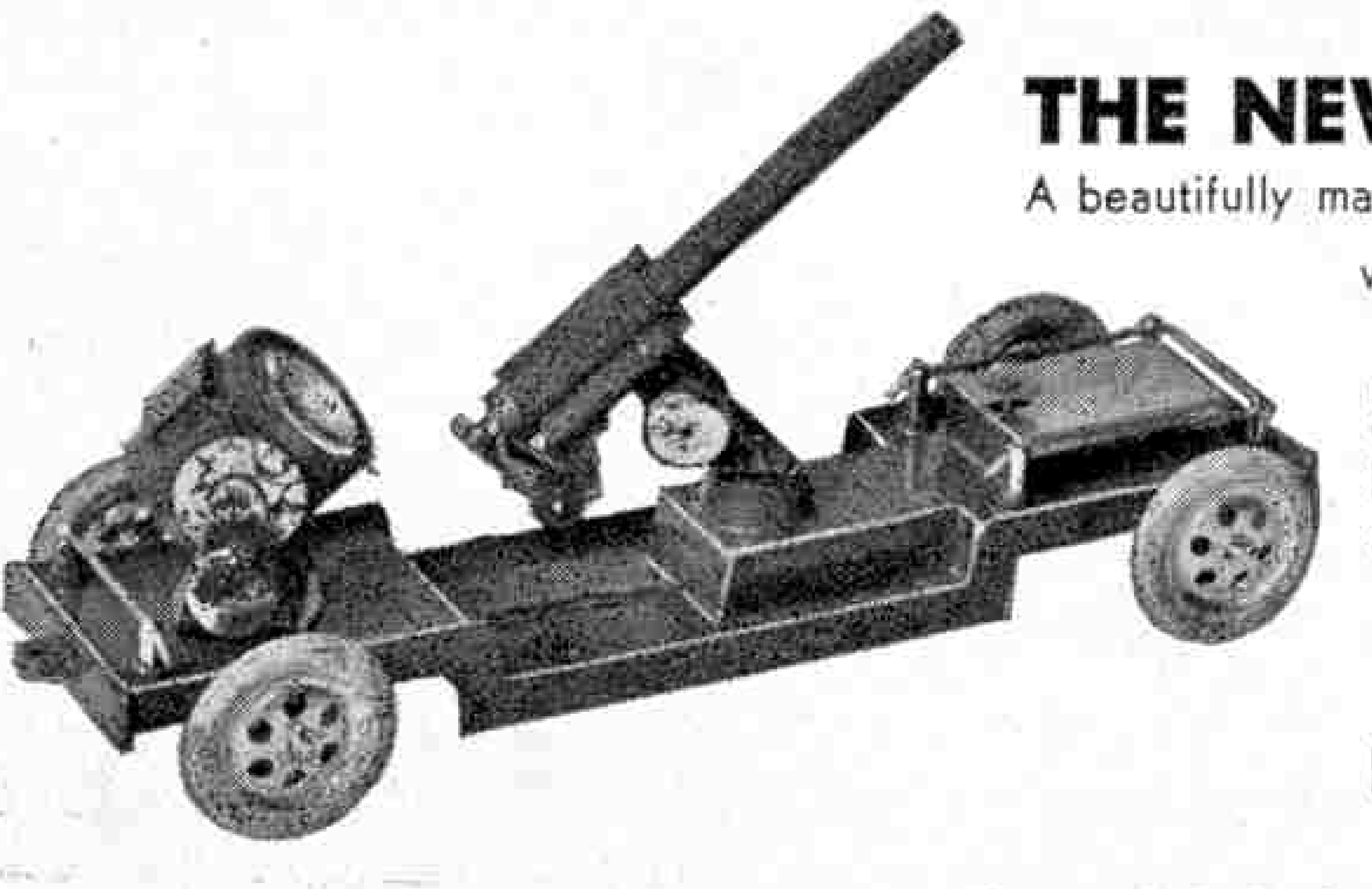

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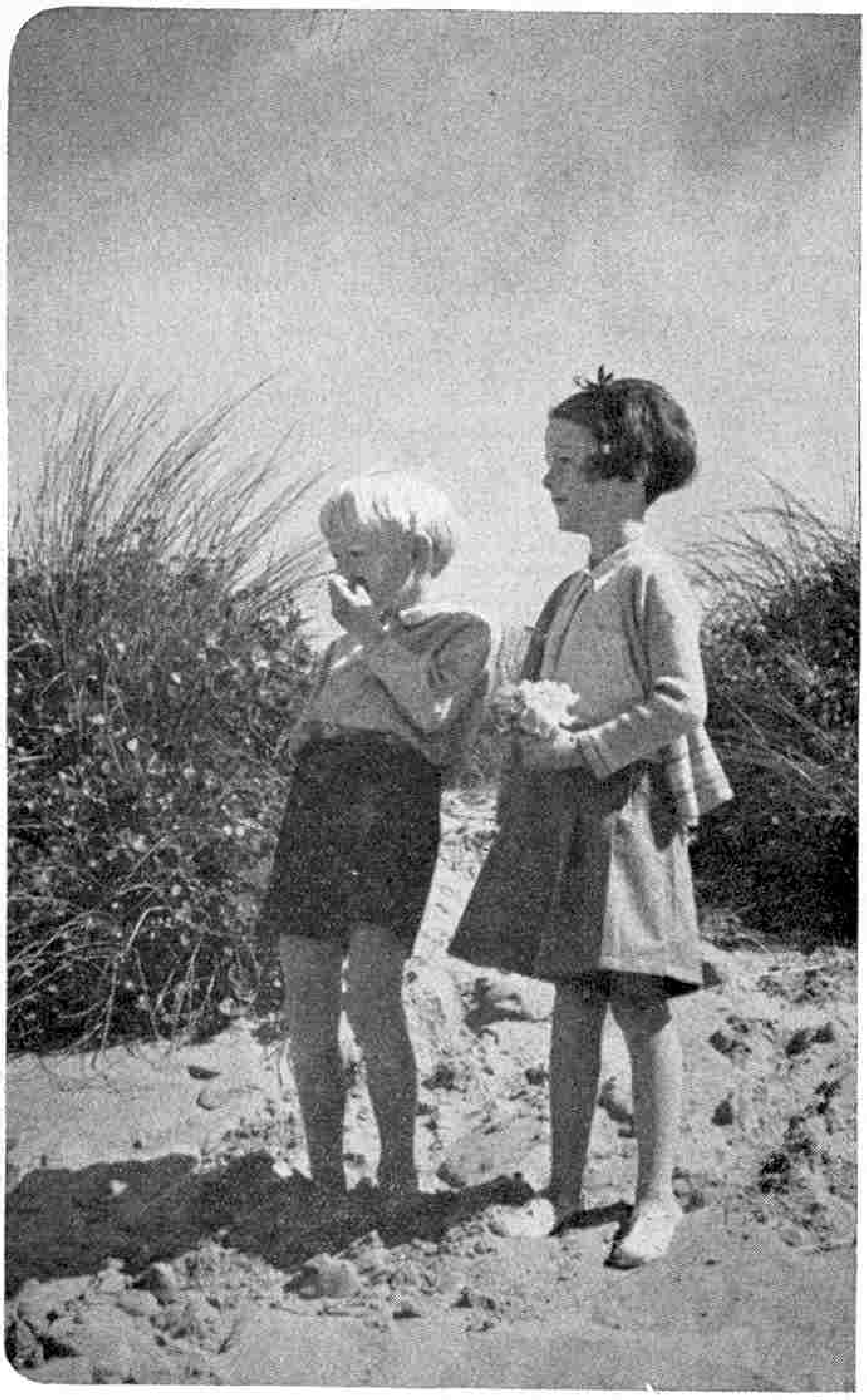

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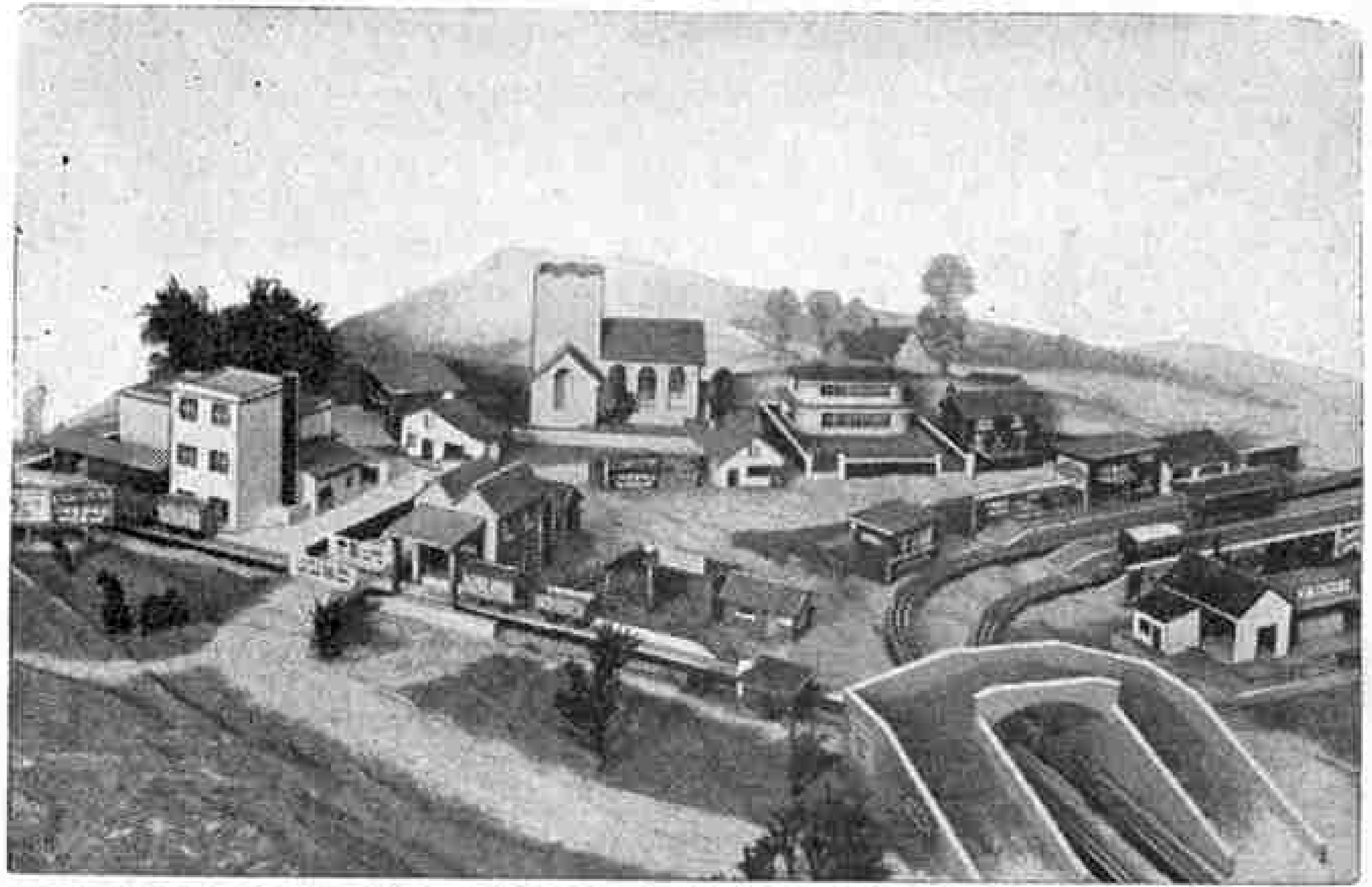

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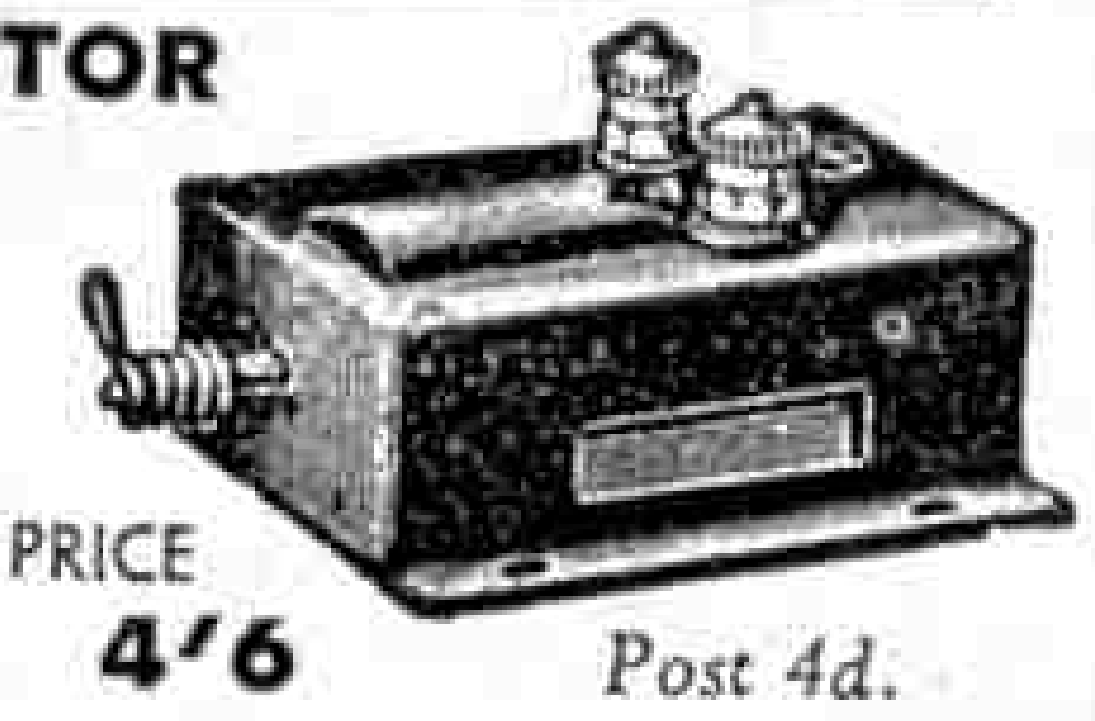

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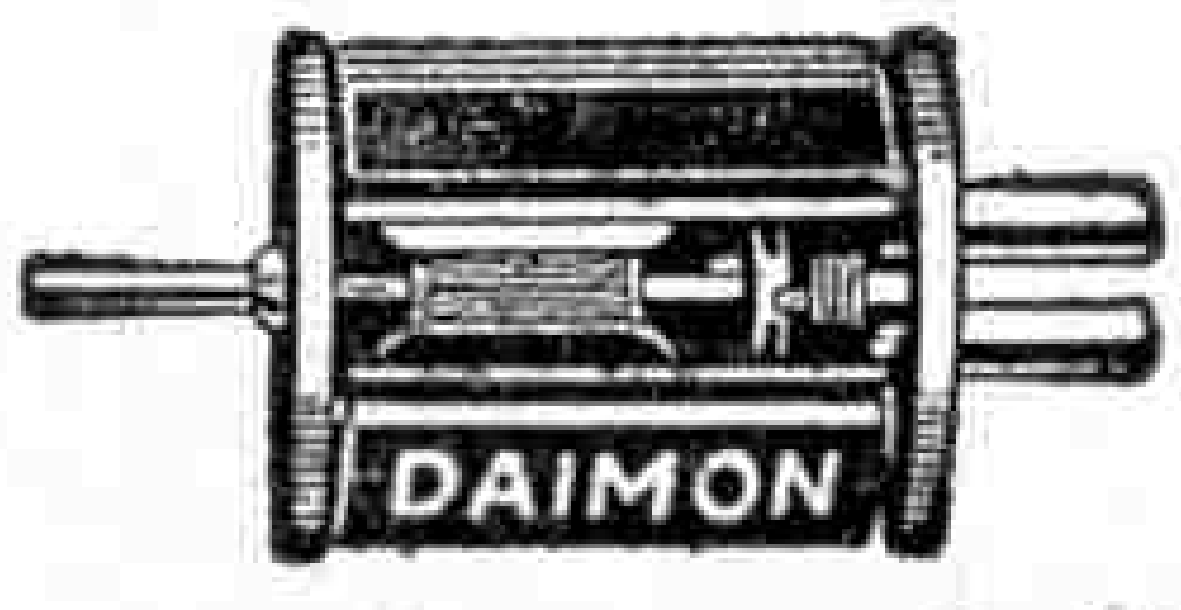

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Sale. £14 worth Red/Green Meccano, including Cabinet, Electric Motor, Transformer. £6 or offer.—25, Ragstone Road, Slough.

M.M.'s Dec. 1933–Oct. 1935, three missing. Offers. Laboratary equipment. Send for lists.—M. Westlake, 47, Lewin Road, S.W.16.

Over £10 worth Red/Green Meccano, including complete No. 6 outfit, two motors, £4 or nearest offer.—Boniwell, 2, Princess Road, Bournemouth (West).

Oak box with quantity uncoloured Meccano, 15/–. Busseys Table-Billiards Set, Ivory Balls, 12/6. Ayres Parlour Games Compendium, 10/–.—Smith, 12, Westcourt, Hounslow, Middlesex.

Sale. 21/– Transformer 10/–, drives Meccano Motors. 50/– Nickel-plated Meccano 21/–.—D. E. Stevens, 37, Dallas Road, Chippenham.

Sale. Meccano Magazines, Jan. 1924–Aug. 1938 inclusive, good condition. What offers?—King, Gardens, The Chantry, Elstree, Herts.

Wireless Bargains. Pye 2-valve set, 12/6, Burgoyne Three, 17/6, 5-valve portable, 19/6, all with speakers,. valves, perfect. Car. paid. Headphones, 2/11.—63, Avenue Approach, Bury St. Edmunds.

62 "Railway Magazines"; 50 "Railway Wonders of the World," for sale complete or separate parts. Best offer secures.—Hughes, 23, Suffolk Avenue, Southampton.

Bargain. Red-green Meccano, value over £6; in cabinet. Take £2.—Davies, Brynmartin, St. Martins Road, Caerphilly.

Sale. "M.M.'s," January 1932 to December 1937. Bound. Good condition. Offers?—Nesbitt, Sandsend Road, Whitby, Yorks.

Sale. Red-green Meccano, Clockwork and Electric Motors. Cost £11 10s. Also "M.M.'s," February 1930 to date. Offers?—Holden, The Square, Great Eccleston, near Preston.

New Micrometer. Moore and Wright, one inch, 17/6.—Pigott, Forest View, Shortheath Road, Farnham.

Sale. "Meccano Magazines," January 1929 to March 1933. Offers?—Parker, 1, Heywood Street, Congleton, Cheshire.

Sale. "Imp" Gas Motor. Almost new. 27/6. What offers?—Benn, 31, Hillview Gardens, North Harrow, Middlesex.

Sale. 53 "M.M.'s," January 1933–December 1937. Clean. What offers?—H. Charnell, 18, Neale Street, Long Eaton, Nottingham.

Wanted. "Magnets" before 1932. Also "Populars," "Rangers," "Schoolboy's Owns."—Ponting, 9, Shakespeare Avenue, Bath.

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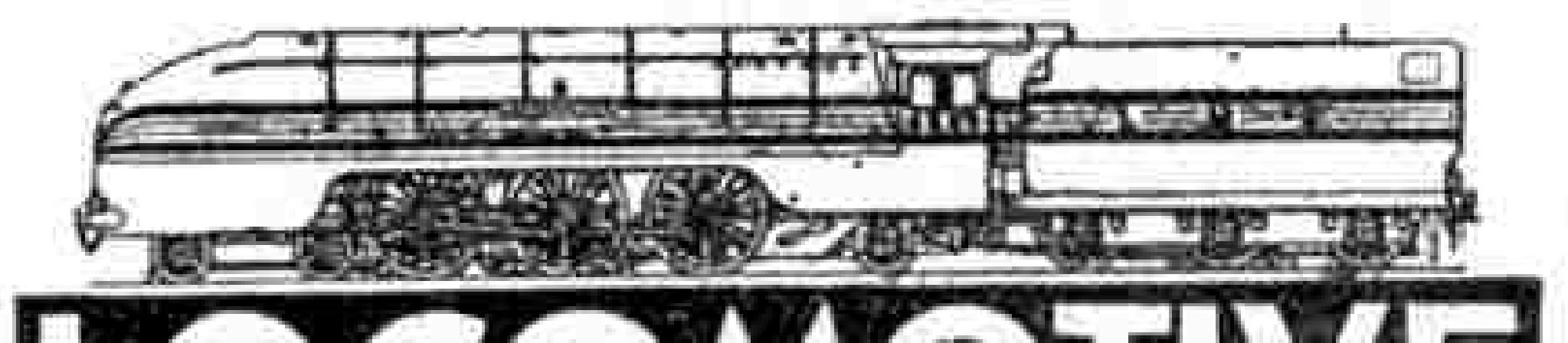

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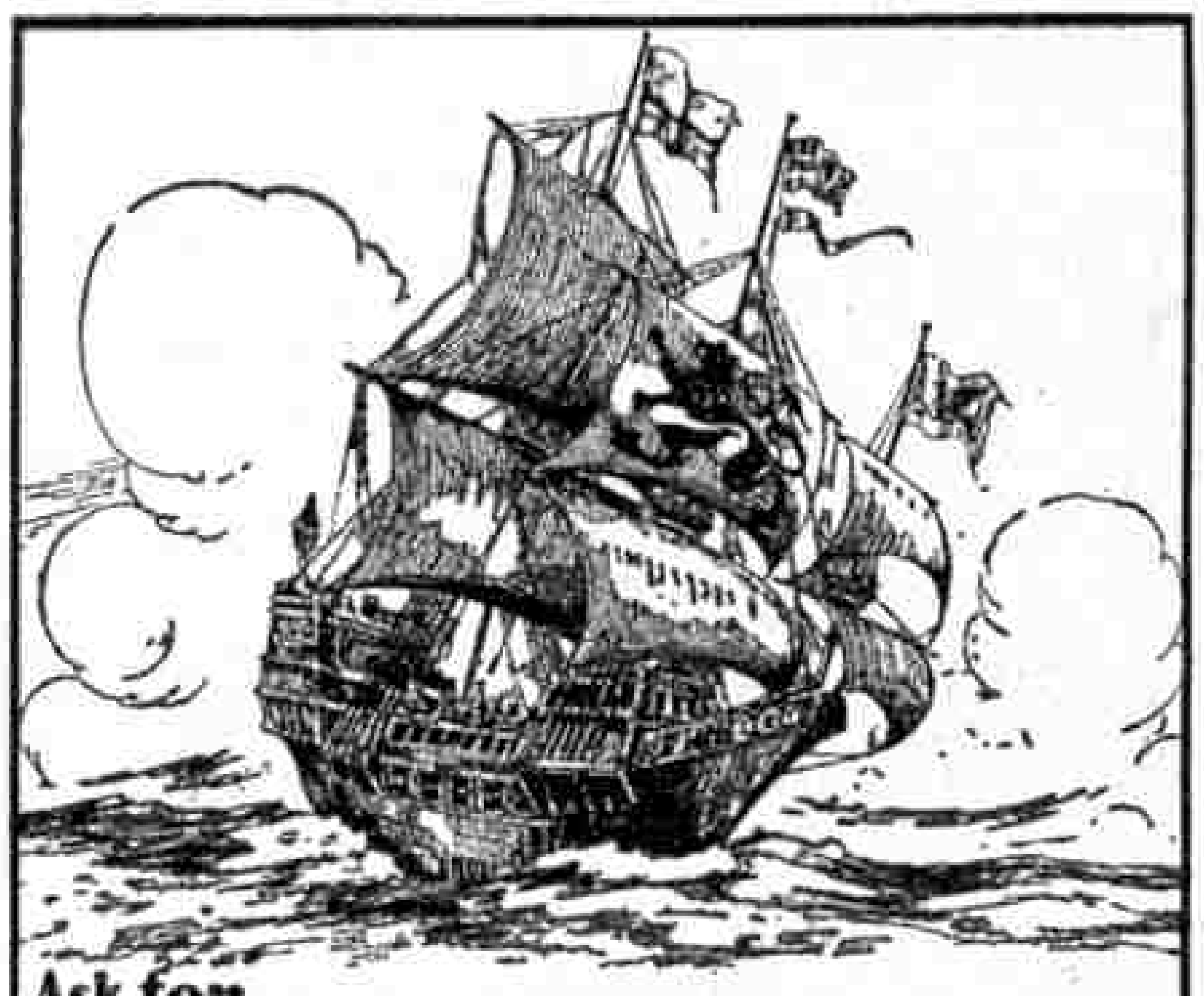

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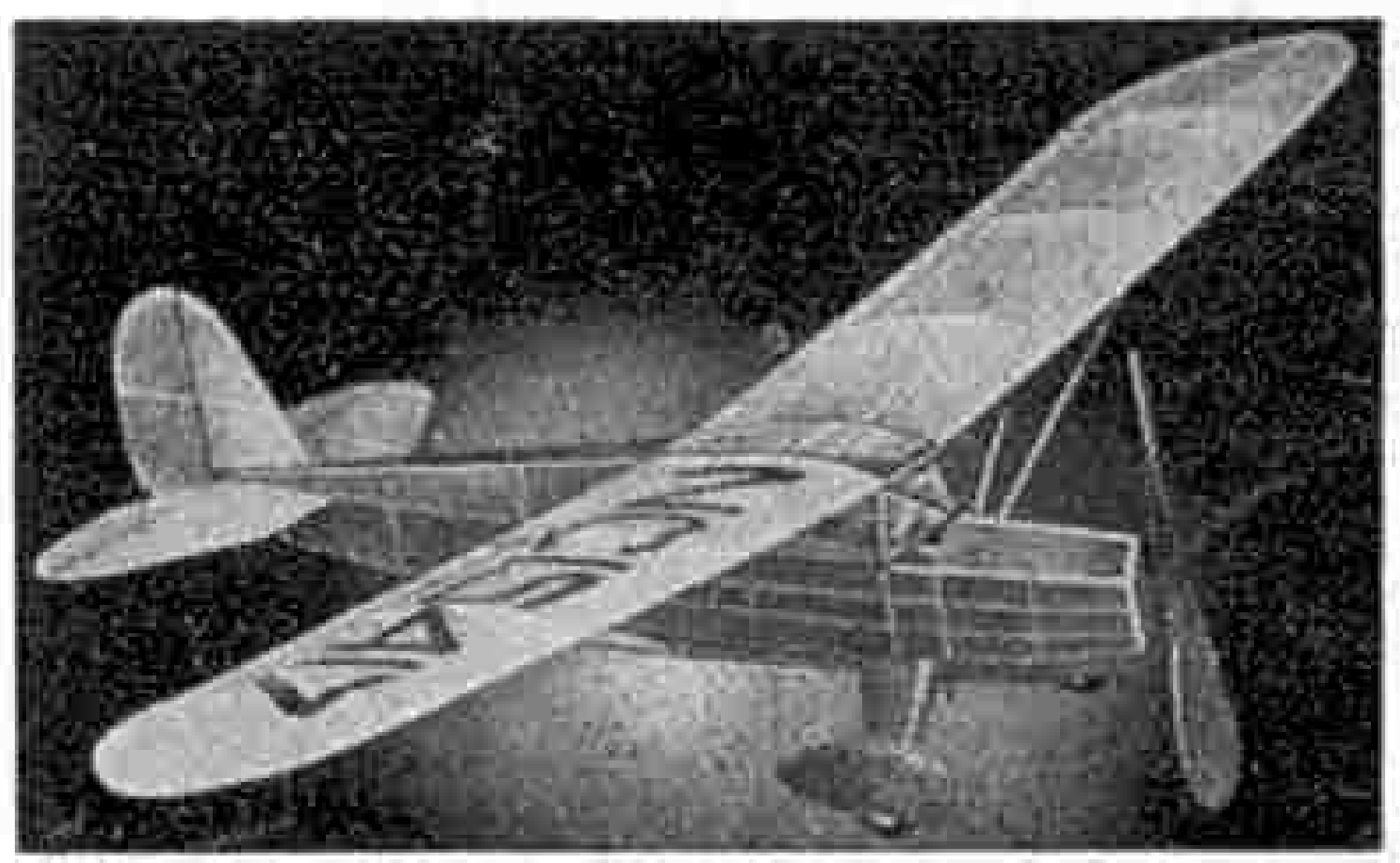

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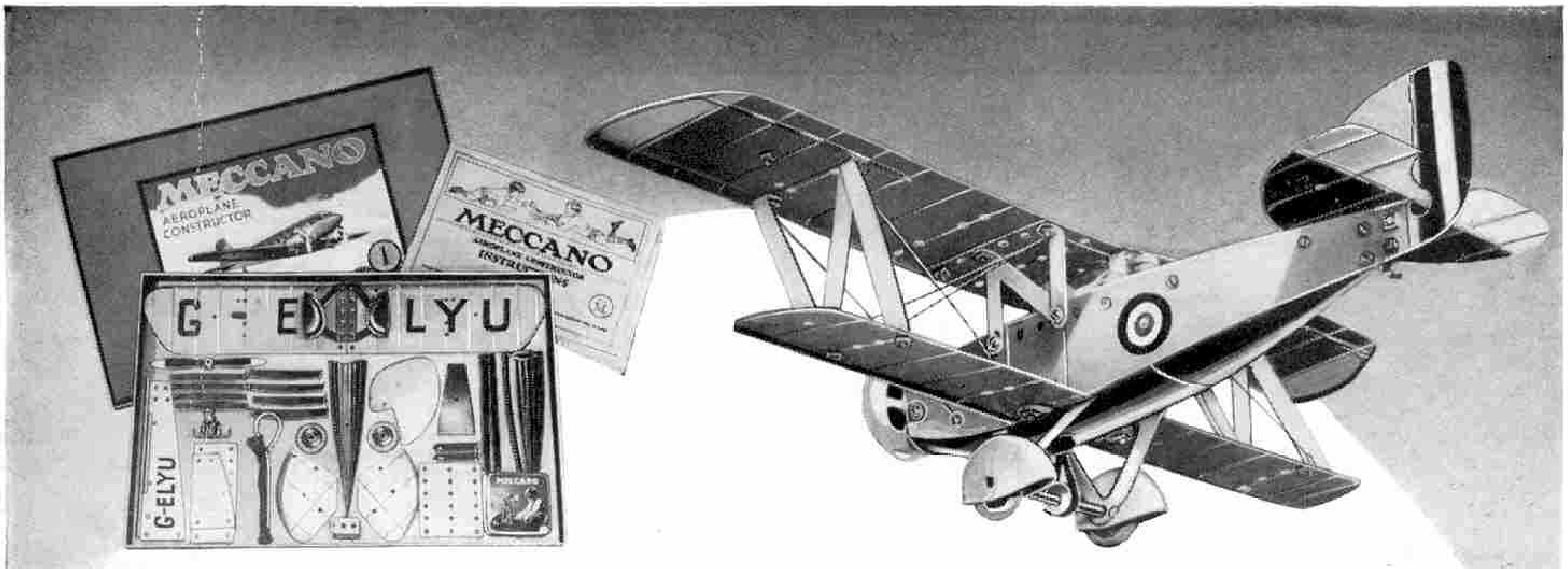

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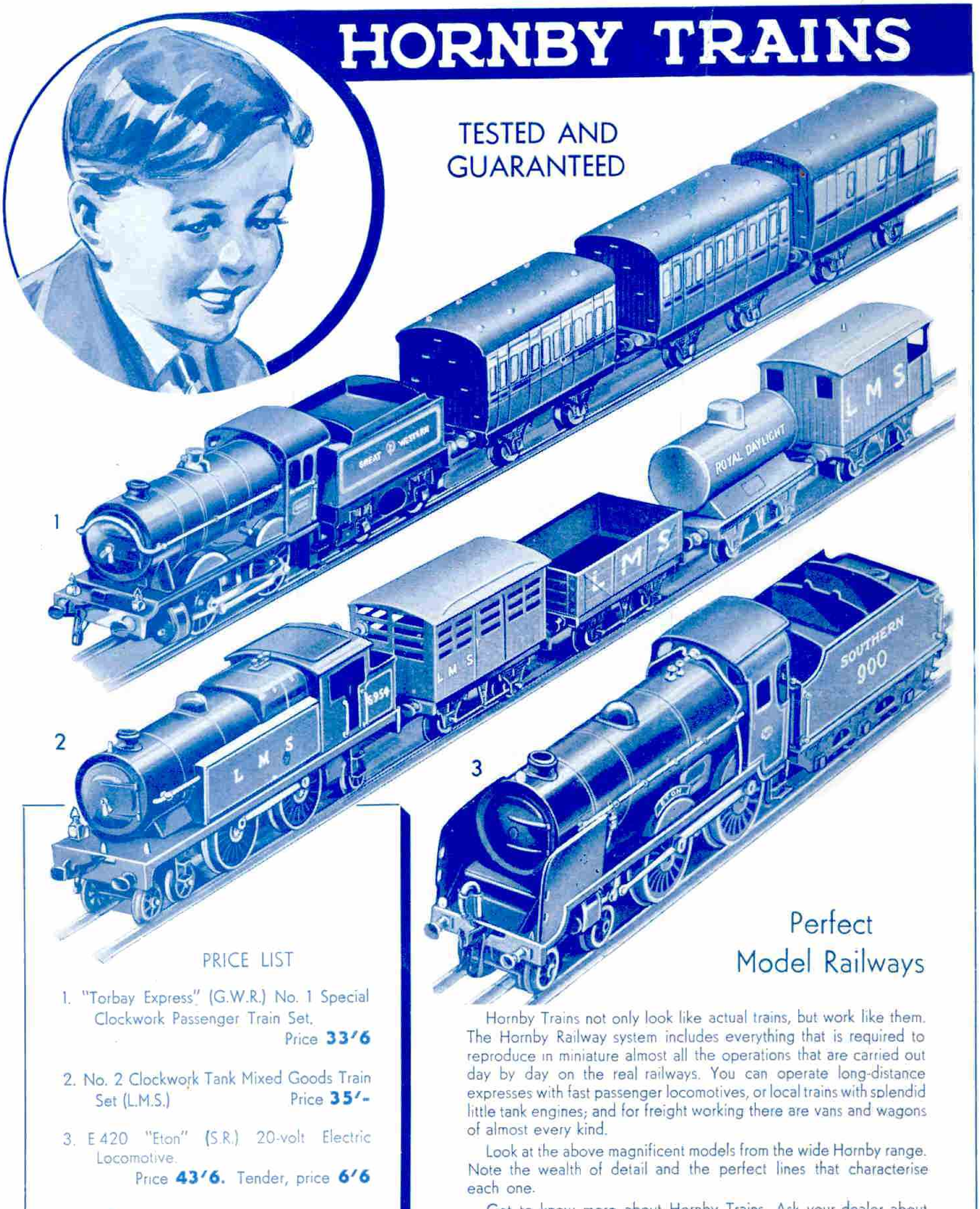

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